THE BRICKBVILDER

VOLUME XXIII NUMBER 5

CONTENTS *for* MAY 1914

PLATE ILLUSTRATIONS

LETTERPRESS

·PVBLISHED·MONTHLY·BY·
NEW YORK· ·ROGERS·AND·MANSON·COMPANY· BOSTON·
ARTHVR·D·ROGERS· ·RALPH·REINHOLD· ·RVSSELL·F·WHITEHEAD
PRESIDENT·&·TREASVRER· VICE-PRESIDENT·&·BVSINESS·MANAGER· ·SECRETARY·&·MANAGING·EDITOR·
·ENTERED·AT·THE·BOSTON·MASS·POST·OFFICE·AS·SECOND·CLASS·MAIL·MATTER·MARCH·12·1892

·SVBSCRIPTION·RATES·
·FOR·THE·VNITED·STATES·ITS·INSVLAR·POSSESSIONS·AND·CVBA·$5.00·PER·YEAR·
·FOR·CANADA·$5.50·PER·YEAR· FOR·FOREIGN·COVNTRIES·IN·THE·POSTAL·VNION·$6.00·PER·YEAR
·TRADE·SVPPLIED·BY·THE·AMERICAN·NEWS·COMPANY·AND·ITS·BRANCHES·
ALL·COPIES·MAILED·FLAT·

RENDERED DETAIL OF UNIVERSITY BUILDING IN SOUTH CAROLINA

ALFRED BUSSELLE, ARCHITECT
THOMAS R. JOHNSON, DELINEATOR

THE BRICKBVILDER

VOLUME XXIII   MAY, 1914   NUMBER 5

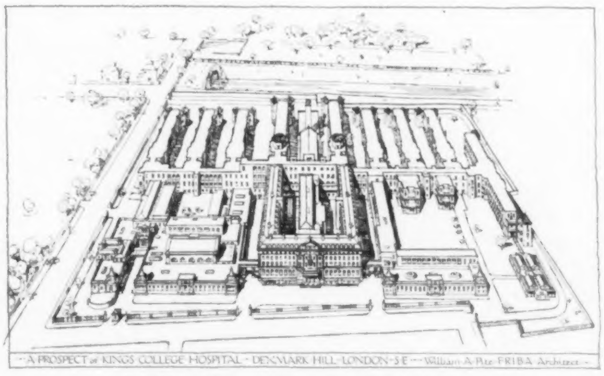
The New King's College Hospital, London, England.

WILLIAM A. PITE, F.R.I.B.A., ARCHITECT.

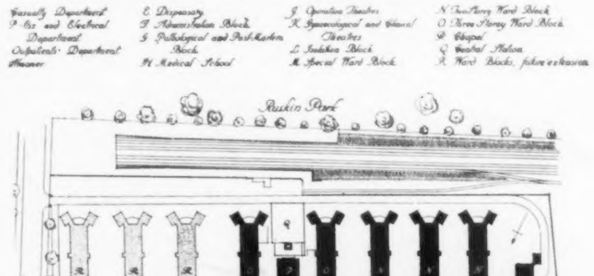
By **R. RANDAL PHILLIPS.**

IT has long since been apparent that the public hospitals of London are not in positions best suited to the population they are intended to serve, for with the never ceasing growth of the metropolis there has been a corresponding migration from the central districts towards the outskirts. Twenty years ago a committee of the House of Lords went carefully into this subject and recommended that a process of decentralization should be followed whenever opportunity offered. The first institution to act on this recommendation is King's College Hospital; and others, including Westminster and St. George's, are preparing to do likewise. The conditions will be clearly realized if past history is surveyed. King's College Hospital, for example, when established in 1839 adjacent to the site now occupied by the Law Courts, was in the midst of the densely populated district around Clare Market. The clearance of this slum area, as part of a London improvement scheme, caused a migration of the former inhabitants, and as time went on the hospital found itself getting more and more out of touch with those who stood most in need of its succor and aid. About ten years ago, therefore, steps were taken towards removing the hospital to a district where it could render greater service. The committee of the House of Lords had recommended that at the first opportunity a general hospital should be built at Camberwell, on the southeast side of London, where a large and densely populated area remained unserved by any such institution; and to that location the authorities decided to transfer King's College Hospital. In 1904 a site on Denmark Hill was selected, and here the great new building has been erected. The site is in every respect an admirable one, comprising twelve acres, rising gently towards the south, and overlooking on this side a pleasant open piece of wooded ground called Ruskin Park. The site is almost rectangular, having a length of 1,000 feet and a depth of 500 feet.

When the removal had been decided upon, six leading architects were invited to submit designs, the plans of Mr. William A. Pite, F.R.I.B.A., being selected. Work on the site was commenced in 1908. In the following year His Majesty, the late King Edward VII (who took a keen interest in the hospitals), laid the foundation-stone, and the present sovereign, King George V, in company with Queen Mary, inaugurated the building in July last, so that altogether about five years have been taken in erecting the hospital. It is not, however, complete at the present time, as only five of the eight ward blocks projected in the scheme have been built, and work on the erection of the medical school and other buildings is still in progress.



Bird's-eye Perspective of Completed Group

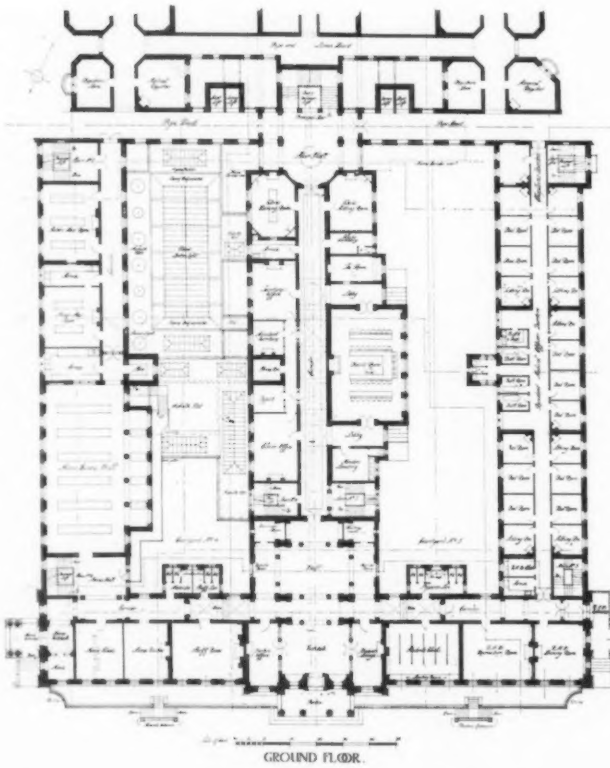


Group Plan

As will be seen from the accompanying block plan, the hospital is practically divided into two parts by the central corridor (nearly 900 feet in length), the eight ward blocks being grouped on the south side of this corridor, while the administration block, the casualty and outpatients' department, and the medical school are arranged on the north side.

Administration Building. The administration building, centrally placed, has secretarial offices, board room, nurses' dining hall, and resident medical officers' quarters on the ground floor. The wards are worked from the first floor, where matron's, sis-

ters', and nurses' quarters are provided, the floors above comprising bedrooms, bathrooms, and other accommodations. The nurses' bedrooms are 12 by 9 ft. At present their number is 188, but when the west wing is completed there will be 303. (The hospital at the present time provides accommodation for 320 in-patients, but eventually this number will be increased to 600, so that, adding the nursing and other staff, the total population of the hospital will not be far short of 1,000.) In the administration building the following will eventually be the proportion of nurses' rooms: bedrooms 303, bathrooms 50, toilets 42, boot-cleaning rooms 13, hair-washing rooms 6.



GROUND FLOOR.

Casualty and Outpatients' Department. The casualty and outpatients' buildings on the east side of the administration building comprise five distinct departments grouped around a large waiting hall. These departments are, — casualty, baths and electrical, outpatients', almoner, dispensary. The casualty and outpatients' departments are close to the main road and are placed in juxtaposition on either side of an entrance court 40 feet wide, spanned by a glazed roof across the two main entrances. The casualty department provides for the immediate treatment of surgical and medical accidents, and includes, in addition to the usual accommodation, a 24-hour

General View and First Floor Plan of the Administration Building
King's College Hospital, London, England

observation ward on the first floor, comprising eight beds, each in a glass-screened cubicle. Here doubtful cases can be watched before being admitted to the wards proper. Similarly, a padded room (the walls and door being lined with rubber cushions) is provided for infuriated cases. In fact, throughout the building every detail has been studied with the object of securing the greatest convenience and safety in working and service.

The underlying plan of effective organization is even better illustrated in the outpatients' department, where, around the central waiting hall (capable of seating 500 people, for whose convenience a central buffet is installed, where refreshments can be obtained), the examining rooms, etc., are so arranged that, after having seen the doctor and received treatment or medicine, patients do not retrace their steps, thus enabling the work of the hospital to go on without disturbance. There are top-lighted corridors on either side of the waiting hall, that on the north giving access to the surgical consulting rooms, with operating theater, and that on the south giving access to the medical consulting rooms, throat and ear department, and children's department, in connection with which last it may be mentioned that there is a separate entrance for whooping-cough cases, just as special provision is made for the immediate removal of infectious cases to the isolation hospital. On the south side, too, on the first floor, is the dental department. Opening off the west end of the waiting hall is the women's and gynæcological department, which includes a large examining room having six undressing boxes, so that while one patient is being seen others may be preparing. In the baths and electrical department all kinds of baths are provided, —alkaline, lime and sulphur, vapor, douche, needle, as well as rooms adapted for X-ray and other electrical treatment. Finally, in this section of the hospital is the dispensary. This is very extensive, being adapted to serve both the outpatients' department and the hospital proper. Lifts communicate with the drug and surgical stores.

Medical School. On the other side of the administration building the medical school is now being erected. The medical school has always been a great feature of King's

Outpatient and Casualty Buildings

College, from the inception of the hospital in 1839, and the names of many eminent physicians and surgeons — Dr. Robert Bentley Todd, Dr. George Budd, Sir William Ferguson, and Lord Lister among them — are associated with it. Hence much importance attaches to the new building. It comprises a fine lecture theater, library, museum, and laboratories.

Waiting Room in Outpatients' Building

Main Wards. Wards are grouped on the south side of the main hospital corridor and, as already stated, five are built, but three more will eventually be added. The two middle blocks, called respectively the King Edward VII and King George V Ward Blocks, are of three stories, the others being of two stories only. All have blow-through arches at ground floor, to prevent the air becoming stagnant between the blocks. The accompanying plan shows the disposition. It will be seen that there is a cut-off lobby between the main corridor and the ward rooms at one end, and blow-throughs between the ward and the sanitary towers at the other end. The wards are each 27 feet wide and accommodate twenty-four beds. The ceiling is of plaster, and the windows extend from 3 feet 3 inches above floor level to within a few inches of the ceiling; they are of a patented type pattern, working in grooves and having lever arms which allow them to be easily adjusted, the sashes always overlapping and also allowing them to be reversed for cleaning purposes; there is a hopper at the top. The floors of the wards are laid with linoleum, the skirting being of a patent composition swept at the angle and finishing flush with the linoleum. The walls and ceilings of the wards are finished with granite silicon plaster, painted with white enamel. Warming is by central double-stoves (two in each ward), supplemented by low-pressure steam radiators. The sanitary towers have water-closets and sink rooms on the one side, and baths and lavatories on the other, every provision being made for the utmost cleanliness and convenience; thus, there is a special cupboard for bed-pans, with external ventilation, and the sink room is so placed that patients do not pass through it. Between the arms of the sanitary towers a sun balcony is provided on each floor, overlooking Ruskin Park.

Special Ward Block. At the west end of the main hospital corridor is a special ward block, of two stories, containing four wards of fourteen beds each, for ophthalmic cases and diseases of the ear, throat, and skin. Detached

from this block, in the northwest corner of the site, is the isolation hospital. This is quite an advance in buildings of its kind — a development from a similar scheme at the Pasteur Institute in Paris. Accommodation is provided for eight patients, in glass-screened cubicles entered off a central nursing corridor, ample ventilation being provided by blow-throughs in the upper part of each room. The patient is bathed in his cubicle, and the soiled linen is taken away in a cylindrical box to be disinfected.

Operating Theaters. The principal operating theater blocks, two in number, each two stories high, are on the north side of the main hospital corridor, between the pathological block and the north wing of the special ward block. They are carried out in the most modern manner, the floors being laid with terrazzo and the walls white enameled. The sinks, sterilizers, etc., are placed in a bay, on one side of which is the anæsthetizing room and on the other the surgeons' room with sterilizing room adjoining. Space is provided for eighteen spectators, who, however, do not come on the actual floor of the theater, but are accommodated in tiers, with separate entrance. Heating is on "panel" system, the pipes being laid within the wall. In all, there are nine operating theaters.

Kitchen Department. This is a most admirably planned department. It is on the basement level of the administration building and has a complete plant for cooking by steam and gas. The floor is laid with tiles, and the roof, of reinforced concrete, is planned with a duct all round communicating with an exhaust fan, which withdraws all fumes and discharges them at the roof level. Thus, no smell of cooking reaches the rooms above the kitchen.

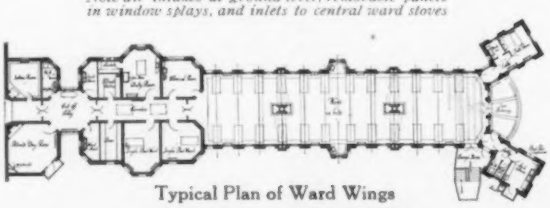
Of the many other parts of the hospital, space does not here permit any extended description: sufficient to say that a refrigerating plant provides the considerable amount of ice that is required daily, a calorifier provides a constant supply of hot water, dynamos driven by oil engines generate electricity for lighting and power, and a special apparatus enables bedding, etc., to be thoroughly disinfected.

Altogether King's College Hospital may be regarded as a very notable example of a large general hospital. It is skilfully planned as a finished group, allowing for a distribution of parts which guarantees efficiency and convenience among the hospital personnel. The accommodation for patients has been determined upon with a practical view to future demands of the community. The various departments are equipped in the most perfect fashion, and the whole displays much architectural distinction.

Interior of Ward

Exterior Detail of Ward Wings

Note air intakes at ground level, removable panels in window splays, and inlets to central ward stoves



Typical Plan of Ward Wings

Entrance to Casualty Building

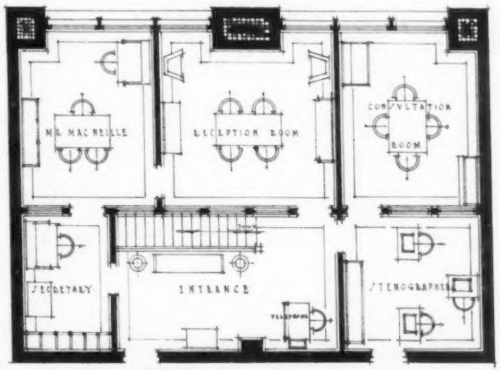
Sun Balcony at South End of Wards

The Business Side of an Architect's Office.

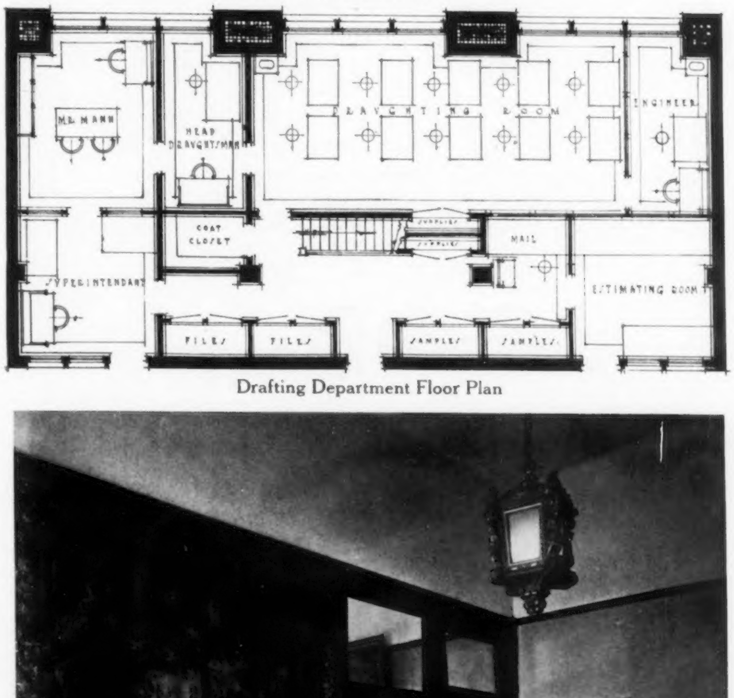
THE OFFICE OF MESSRS. MANN & MacNEILLE, NEW YORK.

By D. EVERETT WAID.

THE offices of Messrs. Mann & MacNeille, 70 East 45th street, New York City, are of exceptional interest, for the reason that this firm of architects undertakes the direct execution of construction work, not as contractor, but as agent for the owner. Many architects are called upon to do such work occasionally and to a small extent; but perhaps only one architect known to the writer other than the firm mentioned possesses a construction department that has developed a complete organization trained to estimate costs, to buy material and hire labor, and to execute construction work according to their own standards.



Administration Floor Plan



Drafting Department Floor Plan

Entrance Hall showing Stairs to Drafting Department

The tendency among architects to sublet work and even to execute it by employing labor and contracting for materials themselves is perhaps due to the existence of many incompetent brokers who call themselves general contractors. That tendency may receive an impetus, when architects realize that their proper standing is jeopardized by the growing power of a class of contractors who are dealing altogether with owners and with an avowed purpose of standing between owner and architect, and even employing architects as a subservient part of their own organizations. Desire for self-preservation should warn present-day architects that they must thoroughly qualify themselves with practical knowledge of materials and construction and structural design. Otherwise they may find themselves on a salary basis making artistic sketches for a business man whose main interest is money profit, and who has not the æsthetic appreciation which animated the craftsmen-architects of old.

Returning to Messrs. Mann & MacNeille, the visitor to their office will agree that the plan conveys no adequate idea of its attractiveness. Mr. Mann, the sponsor for the designing abilities of the firm, has his headquarters nearby, if not always in the drafting room, which is located in the "pipe-gallery" story of one of the new Grand Central office buildings, where the rent is about half the rate of the upper portion of this duplex office.

The photographs and plan together give some idea of the arrangement and fine furnishing of the entrance hall and the reception room, which is supported by a corresponding businesslike elegance and richness throughout the remainder of the office.

Mr. MacNeille, who is a trained engineer and who had valuable experience in one of the big engineering offices before he became a practising architect, is especially interested in the construction work of his

Form F

1

Emergency Order

Placed Subject to Contract Conditions on Back Hereof

E.O. No 406

Put this Order Number on your bill and procure Material Receipt from Foreman in charge when you deliver the goods.

Work No. .... Owner ....

Date .... Location of Work ....

Shipping Instructions ....

Quantity	Description	@	Amount

N. B. Execute in Triplicate. Send Grey Copy to Mann & MacNeille. Tissue Copy to the Building, and Yellow Copy to Dealer.

MANN & MACNEILLE

Per ....

2

.... New York, ...

Owner's Name

....

Address

We beg to inform you of the following alterations which we have made in your plans and specifications at

Your request to ....

Your letter of ....

Or for the best interest of the work.

We estimate the above will entail

an additional cost / a saving of $ ....

Yours

MANN

Execute in triplicate
One copy to Owner
One copy to Secretary
One Copy to General Foreman

OWNER .... HOUSE No.

3 ....

STATE HERE EXPLICITLY WHAT IS TO BE INCLUDED IN THIS CONTRACT

AWARDED TO .... CONT. PRICE $

START WORK

COMPLETE WORK

PAYMENTS

AMOUNT ALLOWED $ .... APPROVED FOR $

X IN THIS SQUARE MEANS THAT THERE IS A MEMORANDUM ON REVERSE SIDE OF THIS CARD

EMPLOYEES' RECORD CARD WORK No.

4

EMPLOYEE TO SIGN HIS NAME ON THIS LINE AT TIME OF EMPLOYMENT

GIVE ADDRESS WHERE EMPLOYEE CAN BE REACHED BY MAIL OR TELEGRAPH

FOREMAN TO FILL OUT INFORMATION BELOW AND MAIL TO HOME OFFICE AT ONCE

EMPLOYED AS	HOUR	DAY	MONTH	YEAR	DATE
THIS LINE TO BE FILLED IN LATER AT HOME OFFICE	HOUR	DAY	MONTH	YEAR	LAID OFF

FOREMAN TAKE NOTICE THAT WHEN THIS EMPLOYEE IS LAID OFF YOU SHALL NOTIFY THE HOME OFFICE ON "DAILY POSTAL CARD" GIVING HOUR AND DATE.

Mann & MacNeille, Agents for Owner

5

THIS AGREEMENT, made in the City of New York this day of , 191 , between MANN & MacNEILLE, (hereinafter called the "Architects"), parties of the first part, and .... (hereinafter called the "Owner"), individually and as the duly authorized agent of .... party of the second part

WITNESSETH:

The Architects have prepared for the Owner plans and specifications for the construction on the Owner's property at .... of ....

The Owner desires to engage the Architects to manage the construction, and as agents for h to take full charge of the work to be performed under said plans and specifications, and such additional work as he may from time to time direct.

Now, therefore, in consideration of the premises, and of the mutual covenants herein contained, the parties hereby agree as follows:

I. The Architects shall, as agents for the Owner, and for h account, engage or contract for the labor and purchase or contract for the purchase of the materials necessary to perform the work above referred to, and shall inspect the work and materials and manage and direct the construction.

The services to be rendered by the Architects hereunder are as follows: procuring estimates, placing orders, employing and supervising the workmen, negotiating, preparing and signing contracts, auditing and paying the bills and pay rolls out of money furnished by the Owner as herein provided, and in general acting as the Owner's agents in managing the entire work.

II. The Architects will provide the services of a general foreman or superintendent in charge of construction, charging the Owner with only so much of his time as he actually spends on the work outside the office of the Architects.

III. The Owner shall pay the Architects as compensation for the services rendered hereunder ten per cent. of the cost of the construction, due in pro rata monthly instalments as payments for account of the Owner are due and payable.

IV. The Owner shall deposit with the Architects in advance, from time to time, sufficent money to pay the bills accruing on the work and their own commissions, and the Architects shall, prior to each new deposit, if the Owner so desires, render a statement of the disbursements made from the previous deposit, accompanying same with receipted bills or vouchers.

V. The cost of the construction shall include the cost of all labor, material, freight, expressage, traveling expenses, permits, telephone, indemnity insurance, and the time of the general and other foreman, and of the pay clerk and the cost of legal services and surveyor's services where they are necessary.

6

MANN & MacNEILLE
70 East 45th Street, New York

PETTY EXPENSE ACCOUNT

Work No. .... Owner ....

Week Ending 191

Date	For What Spent and by Whom Procure Receipt where possible and attach to this slip	Class'n No.	Amount
	Total		

Amount on hand at commencement of week

Received during the week ....

Total ....

Spent during week ....

Amount on hand this date ....

.... Signature of Foreman

7

PROFESSIONAL CODE AND CHARGES FOR MANAGING CONSTRUCTION

MANN & MacNEILLE, Architects

70 EAST 45th STREET, NEW YORK

SERVICES RENDERED

Procuring estimates from sub-contractors, after separating the work into its different divisions for this purpose; negotiating for, preparation of, and signing of the sub-contracts; and the direction of the construction.

Listing the quantities of materials required, procuring prices on same, placing the orders and auditing the bills.

Employing and supervising the workmen, foremen, general foreman, and when necessary a pay clerk, issuing the pay rolls, paying and auditing same;

And in general acting as the owner's agent in managing the building operations.

CHARGES

10 per cent. of the cost of the work for managing its construction. He is also charged the cost of telephone service, expressage, traveling expenses surveys, law suits and other disbursements for his account.

Payments to the Architects are due pro rata as payments for labor and material become due.

When the owner desires, in advance, a complete detailed estimate of the cost of the labor and material for his house, this will be charged for at the cost of preparing same to the Architects.

FINANCING

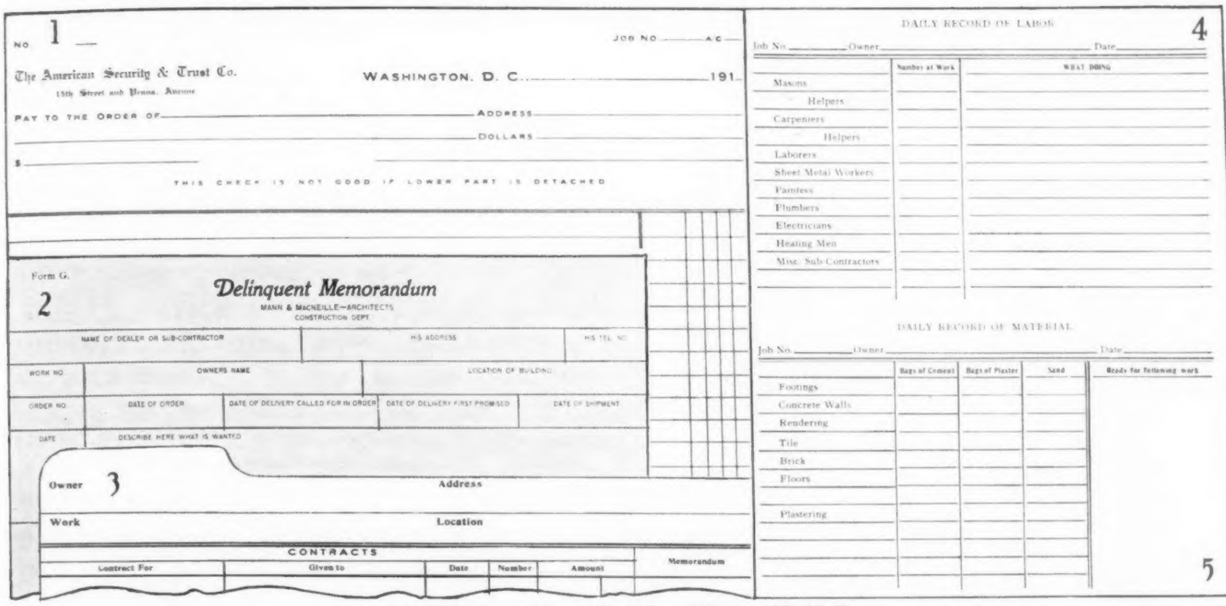
The arrangement for financing which we have found most satisfactory is for the owner to deposit with us about ten per cent. of the proposed cost at the time the work is commenced.

From this amount we pay the bills for labor and material as they become due, taking advantage for the benefit of the owner of any professional, cash or other discount. When the sum deposited approaches exhaustion we render an itemized statement to the owner of the amounts expended, accompanying same with vouchers or receipted bills if he desires.

He then reimburses us this amount. This arrangement continues until the building is completed and final accounts rendered.

1. *Order for materials or labor issued and accepted under conditions of contract printed on reverse side. Materials called for in such order when delivered at the building are checked by foreman, who gives contractor an itemized receipt which forms the basis for checking his bill.* **2.** *Printed notice to inform clients of additional expense made necessary in the course of construction.* **3.** *Card for office use attached to tabulation of bids authorizing letting of contract.* **4.** *Card record of each employee on construction work.* **5.** *Form of agreement for managing construction. A sixth condition permitting the owner to terminate the contract at any time by compensating the architects to date of termination and space for signatures of the contracting parties appears on the reverse side.* **7.** *Form stating services rendered and compensation for the same to the architects.*

PRINTED FORMS IN USE IN THE OFFICE OF MANN & MacNEILLE



NO. 1 — JOB NO. —— A/C ——

The American Security & Trust Co.
15th Street and Penna. Avenue

WASHINGTON, D. C. —— 191—

PAY TO THE ORDER OF —— ADDRESS ——
—— DOLLARS ——
$ ——

THIS CHECK IS NOT GOOD IF LOWER PART IS DETACHED

Form G.
2
Delinquent Memorandum
MANN & MACNEILLE—ARCHITECTS
CONSTRUCTION DEPT.

NAME OF DEALER OR SUB-CONTRACTOR	HIS ADDRESS	HIS TEL. NO.

WORK NO.	OWNERS NAME	LOCATION OF BUILDING

ORDER NO.	DATE OF ORDER	DATE OF DELIVERY CALLED FOR IN ORDER	DATE OF DELIVERY FIRST PROMISED	DATE OF SHIPMENT

DATE	DESCRIBE HERE WHAT IS WANTED

Owner 3 Address
Work Location

CONTRACTS

Contract For	Given to	Date	Number	Amount	Memorandum

DAILY RECORD OF LABOR 4

Job No. —— Owner —— Date ——

	Number at Work	What Doing
Masons		
Helpers		
Carpenters		
Helpers		
Laborers		
Sheet Metal Workers		
Painters		
Plumbers		
Electricians		
Heating Men		
Misc. Sub-Contractors		

DAILY RECORD OF MATERIAL

Job No. —— Owner —— Date ——

	Bags of Cement	Bags of Plaster	Sand	Ready for following work
Footings				
Concrete Walls				
Rendering				
Tile				
Brick				
Floors				
Plastering				

5

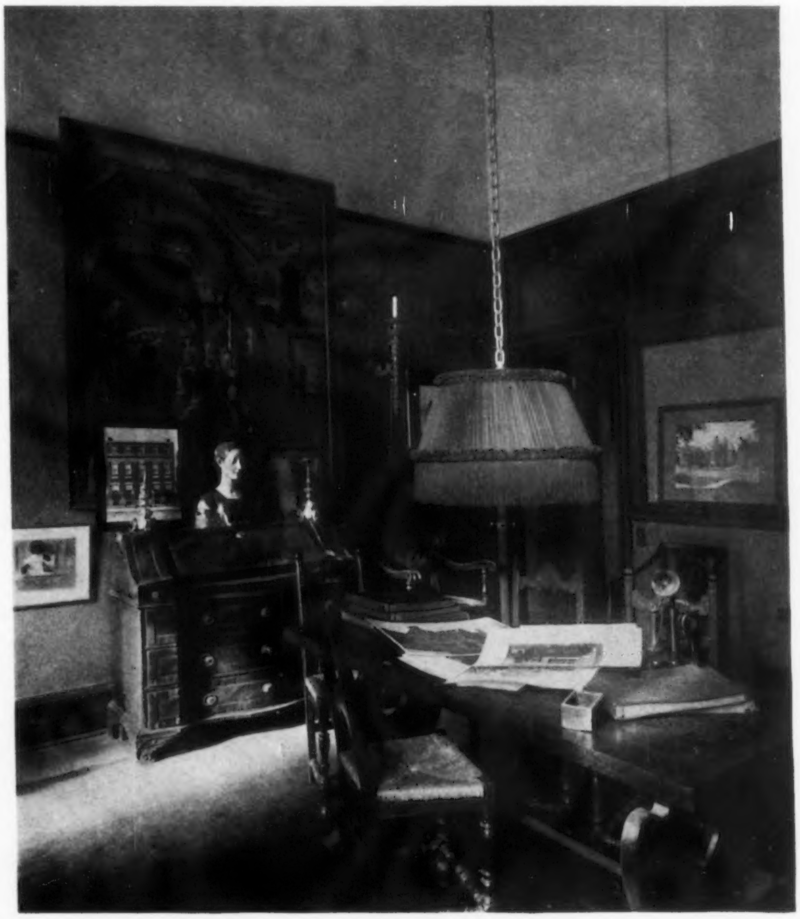
Printed Forms in Use in the Office of Mann & MacNeille

1. Bank check voucher used by architects in special accounts for construction work. 2. Form for notice to office of delayed shipment of materials. 3. Guide card for use of chief draftsman. Behind this guide is kept register of drawings and records of their issue and other memos relating to the building. 4 and 5. Work slip and follow-up memorandum for office use.

firm. In developing their system he adopted the rule of providing printed blanks for simplifying business administration only after experience had demonstrated their need and indicated the form they should take. Their forms therefore represent the demands of experience and not the result of theory.

Mann & MacNeille, after preparing drawings and specifications, make detailed estimates of cost while they are getting bids from contractors. If their own estimate, plus their charge of 10 per cent, does not better the contractor's bid by 10 per cent or more, they advise the client to let the contract. If the client wishes them to undertake the construction, they execute a special contract agreeing to act as agent to manage construction. The owner is expected to deposit with them funds sufficient to cover liabilities at all times and permit them to secure the best prices by reason of their custom of paying cash or discounting bills. Close scrutiny is kept on the progress of work, and daily reports provide a record of costs of both labor and material. A daily comparison of estimated and actual costs of construction is thus possible. It may be remarked that such checking is most essential, and it will be found the rule in the business of successful contractors.

Their system also avoids friction over extras, by written notices which inform the owner of the cost which any change may involve. Several of their more important blanks are here reproduced which may interest those who are not yet equipped to manage construction work.



Reception Room
Office of Mann & MacNeille

MAIN PORTAL
HOSPITAL DE SANTA CRUZ, TOLEDO

Some Old and Unfamiliar Spanish Buildings.

PART II. HOSPITAL DE SANTA CRUZ, TOLEDO.

By ARTHUR G. BYNE.

Illustrated from Photographs Specially Taken by the Author.

THE Hospital of the Holy Cross was a foundation by Cardinal Pedro de Mendoza, who had already built the one of the same name at Valladolid. Enrique de Egas was architect for both. The Toledo edifice was built between 1505-1515.

De Egas and his powerful patron had fallen out over the Valladolid hospital, because the façade was too severe. Mendoza was enormously wealthy and proportionately ostentatious, and in his eye it was "poor and wretched." He died before the Toledo work was begun, which left De Egas to carry out his schemes unafraid that the façade would not be found rich enough. The influence of the Valladolid incident is apparent, nevertheless, for the portal is much more heavily ornamented than in the preceding structure.

Starting as a Gothicist, this architect had become an enthusiast over the Italian importation of Renaissance and tried to understand it not only in its ornament but fundamentally. How well he succeeded is shown by the classic symmetry of plan in his four great hospitals, — the two already mentioned, and those of Granada and Santiago. Considering Spain's remoteness from the Renaissance movement, and the fact that long internal disturbances had retarded her intellectual growth, these early Renaissance structures are specially remarkable. It is hard to believe that they were designed only fifty and sixty years after Brunelleschi's Pazzi Chapel at Florence, which, very Roman though it is in many features, is considered the first completed building of the Italian Renaissance; and harder still to believe that De Egas had probably never been in Italy, but got his knowledge through Italian builders who sought employment in Spain.

The Toledan example is in the form of a great Maltese cross. It shared the fate of other over-ambitious architectural undertakings — never to be finished; but even incomplete, it ranks with the Archbishop's Palace at Alcala as heading the list of fine Spanish Renaissance buildings.

Only the doorway (with detail) and the lower part of the staircase are shown. All is much dilapidated; for Toledo, besides being overtaken by poverty, was badly battered by the French in 1808. A restoration is on foot, but unless this is more intelligently carried out than the restoration of *San Juan de los Reyes* in the same city, the decrepit old hospital might better go unpropped to its death. There are encouraging signs, however, in the very small portion of the patio thus far repaired, that the work is in sympathetic hands.

The doorway is of a fine, white stone, called *piedra blanca de la Rosa*, and marble, and the whole has turned into fascinating old ivory tints. It can be clearly seen that the detail is purer Renaissance than the ensemble, since the latter, particularly at the top, takes some egregious liberties with the style. This portion, one feels, must have bothered the architect greatly; till at last, in desperation of a Renaissance solution, he turned to his early Gothic training to help him out.

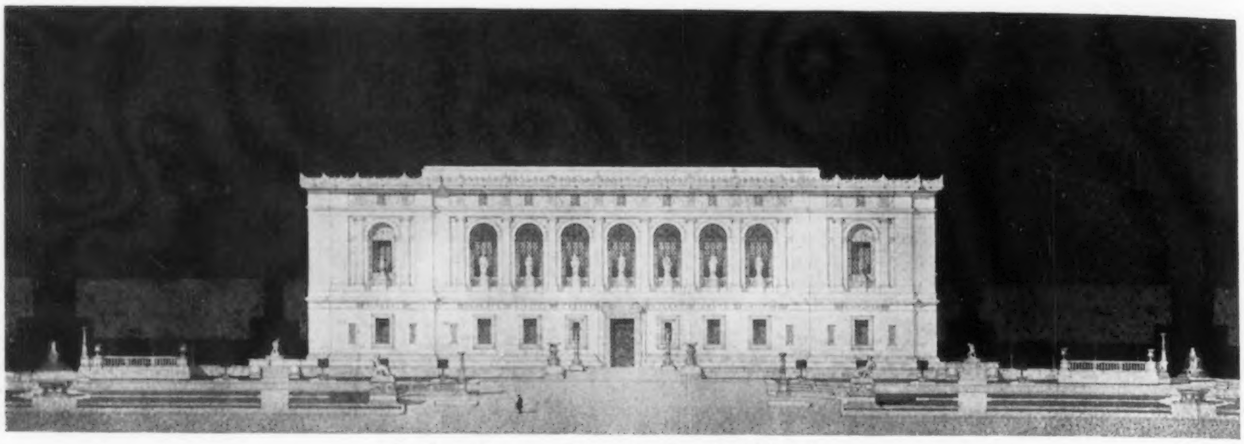
The lower part, on the contrary, is admirable. The rectangular door frame and its adjacent colonnettes are surprisingly pure; and the spot of *amorini* supporting the Mendoza arms is as charming and as early as any similar motif in Italy. Throughout the lower portion the detail resembles early Lombardy work, particularly certain door and window motifs of the Certosa de Pavia which antidates De Egas' work by only a few years. It is hardly assuming too much to say that among the stream of Italian workmen employed in Toledo from the foundation of its great cathedral down to the middle of the XVIth century some must have come straight from Pavia. This would explain why the doorway is so like terra cotta ornament, for in Lombardy the early use of burnt clay products had a pronounced influence later on stonework.

In the staircase illustrated is a newel post that is popular throughout Spain, this one probably being the father of the large family. Undeniably crude in places, as at the intersection of the rail with the capital, it is chiefly interesting as having formed a style in newels. The shapeless block on top is a much mutilated heraldic shield. The balusters here, as later in Alcala, have been cut, each three, out of one block of stone. The feat was a prodigious one, more remarkable, indeed, than commendable. To turn out a single spindle whose rings follow the rake of the stair instead of being horizontal to itself, is too difficult to be worth while; to work out three in this manner by piercing a block of stone, and to retain, besides, a connecting band, is too stupendous to be believed if one had not examined into it. The string piece of the staircase has a beautiful section, and, furthermore, it makes a very creditable intersection with the base of the newel.

Another structural peculiarity here is a big Gothic segmental relieving arch passing behind the three semicircular Renaissance arches that support the floor over this staircase. It would seem that De Egas, after constructing these latter, could not believe that they would do their work adequately, and so swung the great flat arch behind to reinforce them — another instance of his only half understanding the new architecture and calling upon the old to help him out.

DETAIL OF MAIN PORTAL
HOSPITAL DE SANTA CRUZ, TOLEDO

DETAIL OF STAIRCASE
HOSPITAL DE SANTA CRUZ, TOLEDO



Cass Gilbert, Architect — Rendered Drawing of Elevation, Detroit Public Library — Thomas R. Johnson, Delineator

Monographs on Architectural Renderers.

BEING A SERIES OF ARTICLES ON THE ARCHITECTURAL RENDERERS OF TO-DAY, ACCOMPANIED BY CHARACTERISTIC EXAMPLES OF THEIR WORK.

V. THE WORK OF THOMAS R. JOHNSON.

LIKE many of the other men who have made a distinguished success at architectural rendering, Mr. Johnson began his art life with the idea of becoming a painter or an illustrator. He is by birth a Canadian, and his first training was acquired in a Canadian art school, but as a comparatively young man he came to New York and entered an architect's office. His tremendous ability, both in rendering and in design, was not at first appreciated, and it may be of interest to note that the designer of the Singer tower did not think the man who was intimately associated with the designer of the Woolworth tower worth $15 a week, and discharged him. The Woolworth tower is spoken of because Mr. Johnson has been for many years in Mr. Cass Gilbert's office, and for most of that time has been Mr. Gilbert's chief reliance in matters of design, at least as far as a man of Mr. Gilbert's strong artistic personality can rely on any one else; but Mr. Johnson is no less capable as a designer than he is as an architectural renderer. Mr. Gilbert early perceived the merit of the rare combination of gifts which Mr. Johnson possesses, that of being able not only to design well, but to throw his designs into perspective with the utmost freedom and rapidity; and so accurate is Mr. Johnson's knowledge of perspective that faults not apparent in direct elevation become surely visible in his perspectives, and much of the work from Mr. Gilbert's office is now designed in perspective aided by Mr. Gilbert's criticism and suggestions.

To one who knows the man's manner of work well, the most fascinating things Mr. Johnson has ever done have been these quick and brilliant studies, in which he mingles pencil, water color, and colored chalks with the most remarkable effectiveness and truth of representation. Nor does his knowledge of architecture stop at design. He was for some years, and perhaps still is, one of the most finished draftsmen in New York, probably the only comparable men being Mr. H. Van Buren Magonigle and Mr. Albert Randolph Ross, both of whom have at least a good deal of Mr. Johnson's facility in perspective and water-color rendering.

The working drawings of some of Mr. Gilbert's work which have been from time to time published, that are signed T. R. J., will be found in every architect's office, and they are not only a delight to the eye in the arrangement of the sheets, in lettering, and in beautiful indication of ornament, but are also very complete and adequate construction details. Mr. Gilbert's office has always turned out extremely well finished working draw-

Study for a Board Room in a Suite of Offices
Cass Gilbert, Architect
Thomas R. Johnson, Delineator

ings, because Mr. Gilbert is himself a draftsman of superior grade and likes and appreciates technically good drawings; but of them all none have been so fine as those which Mr. Johnson has made, although in all of them his technique may be found to have been reflected.

Another phase of Mr. Johnson's ability which may not be out of place to mention in an article of this kind, although perhaps illustrations of it are hardly necessary, is his skill at caricature: his sketches of the different men he worked with when in Mr. Gilbert's office are delightfully gay exaggerations without being in the least unkind; many of them are better than portraits, in that the real spirit of the man has been grasped and set upon paper: and while little of Mr. Johnson's work has ever been done for the humorous magazines, his ability in that direction is far beyond that of many men who make their living from it.

In architectural rendering there is no phase that he has not completely mastered; his rendered plans, while perhaps not as brilliant as those turned out by Mr. Hornbostel, have a severe and sober dignity which makes them models for competition work, and probably no more beautiful renderings of elevations have ever been produced either here or abroad than his. Our competitions now are conducted under very rigid rules, prohibiting the use of color, or as some of them read, "perceptible color"; this, of course, with the idea that the work will have as uniform a quality as it is possible to produce, so that the judges may not be misled by the tricks of rendering; and while Mr. Johnson in his renderings uses no "perceptible color," its presence is felt even though it may not be perceived, and even a photographic reproduction, such as that of the Detroit Public Library, shows this peculiar quality, which is the happy possession of but a few.

Purely architectural renderings of elevations, when carried as far as is this one, are apt to become cold, hard, and forbidding machine drawings rather than soft, warm, architectural drawings; but somehow Mr. Johnson's are never pushed over the edge — they are perfection, but not the perfection which repels.

Study for the Woolworth Building
Cass Gilbert, Architect
Thomas R. Johnson, Delineator

Cass Gilbert, Architect — Perspective View of University of Minnesota Buildings, Minneapolis, Minn. — Thomas R. Johnson, Delineator

The black sky is a trick which everybody knows as making a building stand out with great strength; but in nine-tenths of the drawings where the dark sky is used, it is at the expense of all luminosity, the building becomes dull and opaque, and the delicacy of fine rendering of detail becomes lost through too great contrast between building and entourage.

Sketch of Warehouse in Brooklyn, N. Y.
Cass Gilbert, Architect — Thomas R. Johnson, Delineator

Mr. Johnson's office studies have been spoken of above as being the most interesting things he does, and two of them have been reproduced in this article — a study for the Woolworth Building and study for the board room in a suite of offices. The study for the Woolworth Building was made in pencil on tracing paper, mounted, tinted with water color and picked out with Chinese white; the shadows are part in pencil and part in color. The great utility of drawings of this kind is in the fact that Mr. Johnson is able to make them so quickly; that of the Woolworth Building, for example, not taking over six hours to draw, mount, and render, and a comparison with photographs of the executed building will show how useful this perspective study has been in developing weak spots in the design and also in the study of fenestration and the projection of the vertical lines. This was but one of many similar studies made for this building, some of them on tracing paper, some on detail paper, and some on heavy hot-pressed paper, all of them extremely rapid in execution, but accurate in perspective. Of course "accuracy" is more or less a comparative term, applying to the mass of the building rather than to such things as the perspective of the elliptical arches; but the roof heights, the projection of the principal vertical lines, etc., were all carefully laid out.

Another study for a similar purpose, but of an entirely different character, is that for the board room in a suite of offices. It was executed entirely in water color with not even much pencil lay out over which to work, and a water-color study like this which takes into account the color scheme and the lighting, as well as the proportions and system of decoration, is, of course, of great value in determining design.

The making of innumerable sketches of this character in which buildings and rooms are studied with as near an approximation to actual conditions as can be obtained in drawings, is the most valuable function which an architectural renderer can perform, and this is, of course, one which requires an intimate knowledge of design, and further than that, of the particular type of design desired by the office for which they are made, and perhaps they could only be made by a man who was very closely in touch with the design of the office and thoroughly familiar with the ideas at the head of it.

The rendering of the warehouse for Austin Nichols and Company was made in pencil on Bristol board, no color at all being employed; while it was started as a study sketch it was finally developed into a drawing to show the clients. It was accepted, and the structure built substantially as indicated in the sketch. The other large rendering, that of the Washington avenue frontage of the University of Minnesota, is a very carefully drawn and rendered water color, and is so absolutely truthful in the delineation of the type of the trees that one sees around a new building, the fencing of the parking space, and the character of the traffic, that it gives a pictorial effect suggestive of work done from a completed scheme.

It will be noticed in all these drawings that Mr. Johnson's mastery of entourage is not excelled even by his rendering of the architecture itself, and part of the illusion of reality which his renderings adequately convey must be due to this. Architectural rendering is usually more or less conventional, even in the offices of very successful men, although architects are so accustomed to see conventions that they do not realize that conventions are being used; and if an architectural rendering is pleasing in color, and of an agreeable pattern, the architect regards it as a finished work, although to the layman it may be nearly as incomprehensible as a working drawing.

The work of Mr. Jules Guerin even may be included in this class, but by sheer beauty of color and also to some extent at least by the familiarity of the laymen with his subjects, he manages to make the necessary appeal to the public; but an architect whose structures are executed as yet only in his own brain cannot push convention too far, and succeed in the main purpose of all architectural rendering, which is to convince the clients of the plausibility of his ideas. Mr. Johnson's work in this way is undoubtedly adapted to popular use, since his colors please the popular as well as the educated taste, without disguising the sound architecture behind them.

Beside his work in Mr. Gilbert's office he has occasionally made renderings for other people in the past, one of which is here reproduced as a frontispiece, and it is of particular interest, because of the admirable indication of materials all the way through — marble is evidently marble, just as the brick and tile cannot be mistaken for anything but what they are. While the drawing is of large scale, and the indication of each individual part is carried to a workmanlike conclusion, the pictorial effect has by no means been neglected.

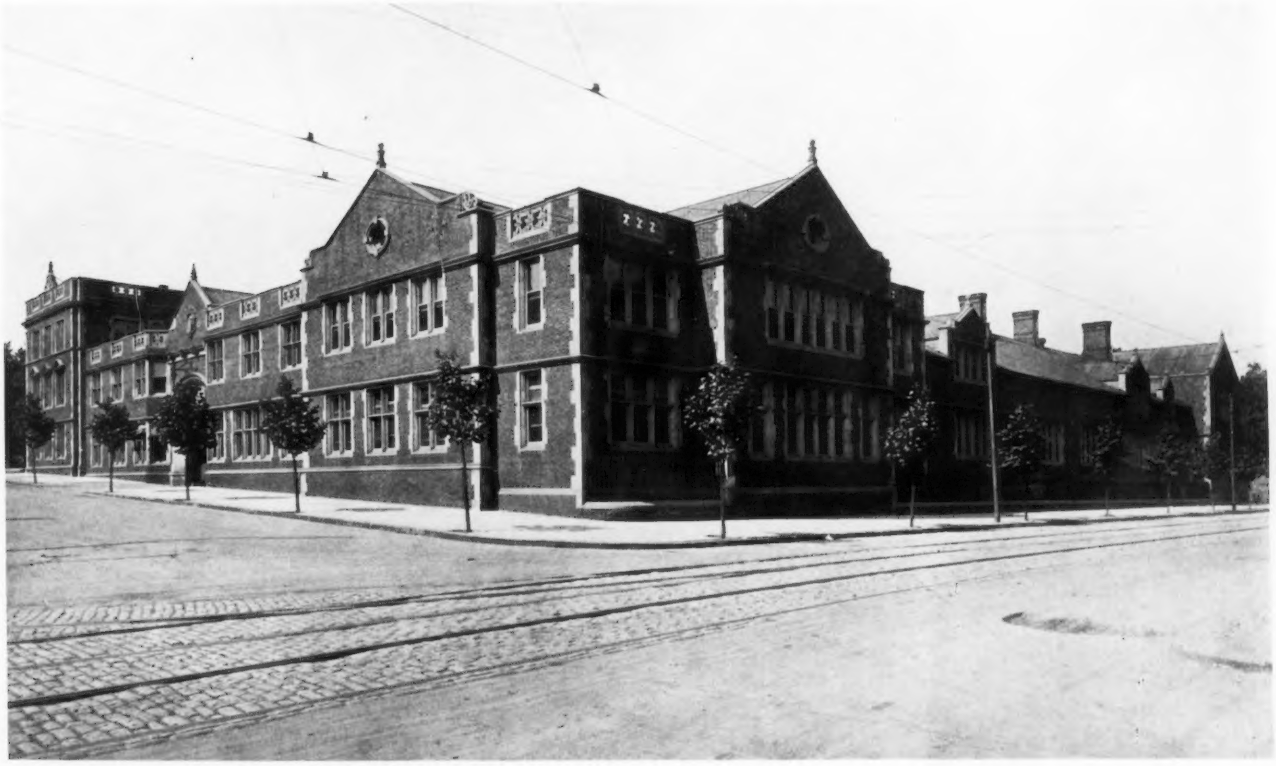
In considering Mr. Johnson's work, one characteristic must be noted which is eminently desirable in work that must have a practical value, — where the men discussed in former articles of this series have each been remarkable for some particular sort of rendering, some trick or talent, of which he has made the most, we find Mr. Johnson's work steady, sober, consistent, of very wide range, both of technique and of subjects, and yet piquant and brilliant as it is refined and quiet.

DETAIL OF ENTRANCE TO COURT

VETERINARY BUILDING, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA.

COPE & STEWARDSON, ARCHITECTS

VIEW IN COURT LOOKING TOWARD LECTURE ROOM



GENERAL VIEW OF EXTERIOR

VETERINARY BUILDING, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA.
COPE & STEWARDSON, ARCHITECTS

VIEW IN COURT LOOKING TOWARD MAIN ENTRANCE

FIRST FLOOR PLAN

SECOND FLOOR PLAN

VETERINARY BUILDING, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA

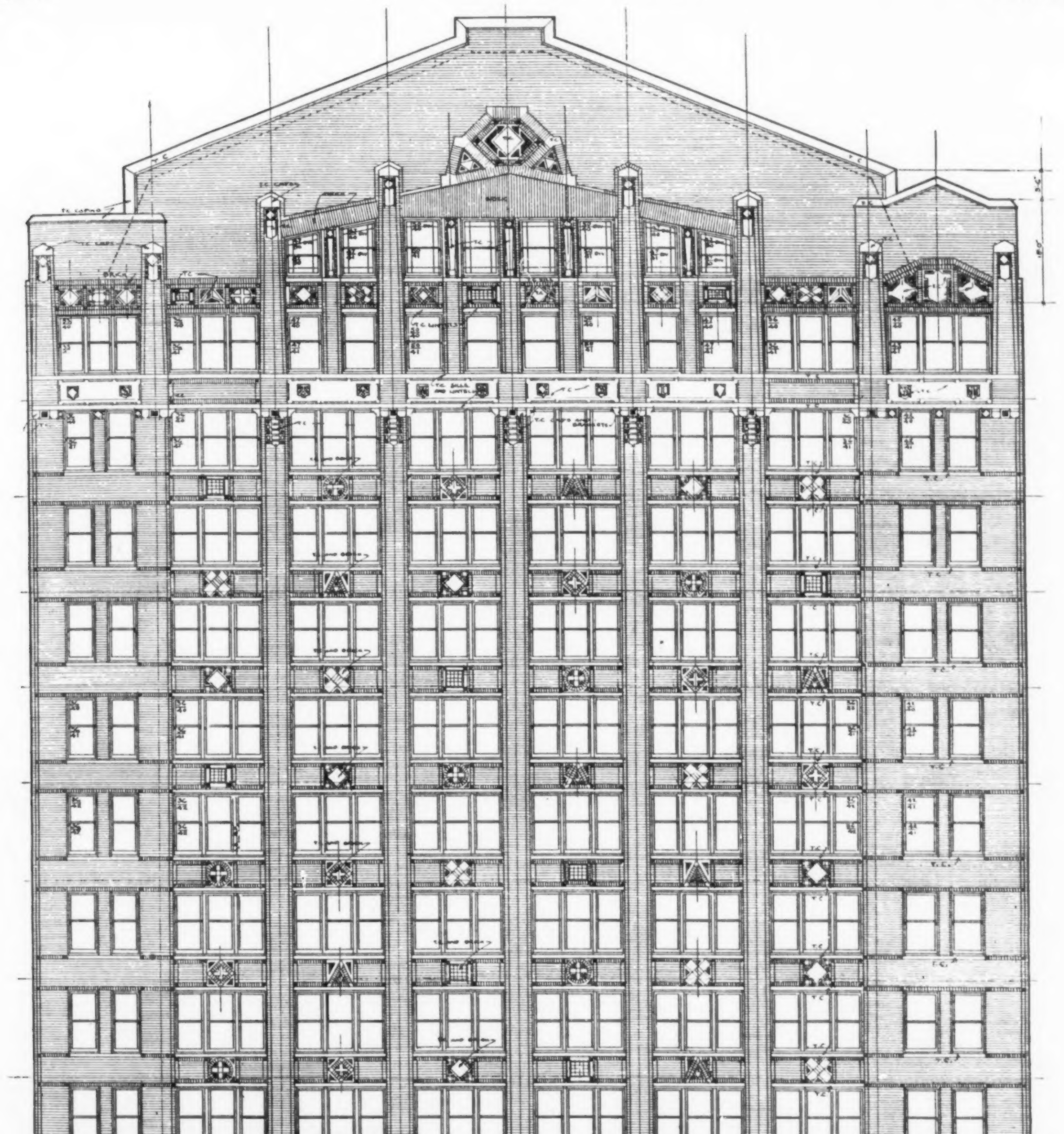
COPE & STEWARDSON, ARCHITECTS

UPPER STORIES

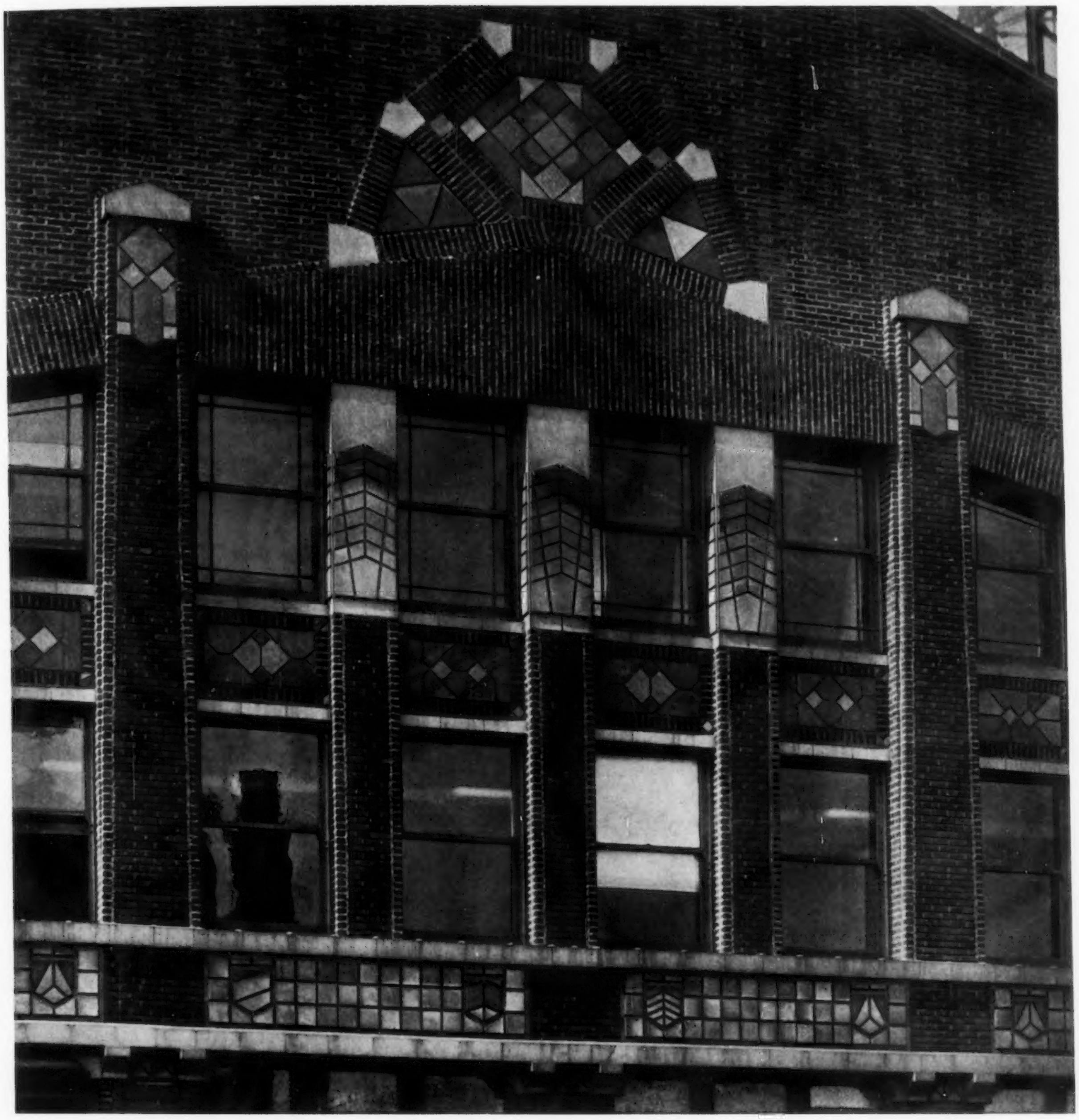
LOWER STORIES

THE FRANKLIN BUILDING, CHICAGO, ILL.

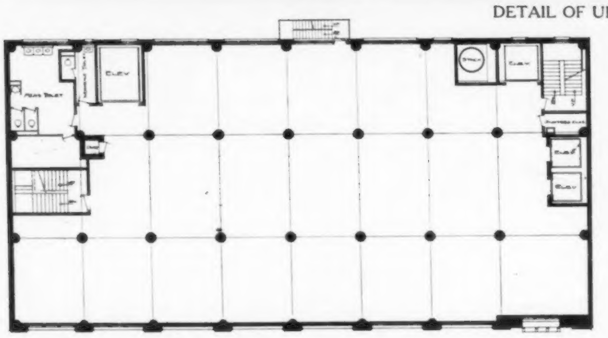
GEORGE C. NIMMONS, ARCHITECT



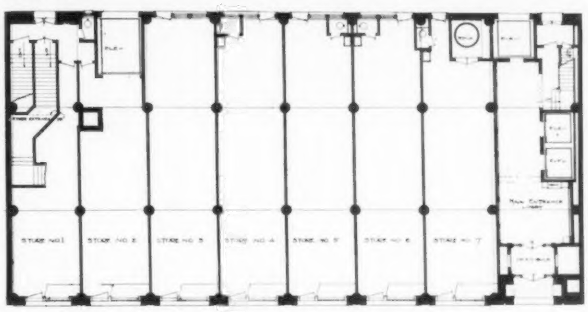
THE FRANKLIN BUILDING, CHICAGO, ILL.
GEORGE C. NIMMONS, ARCHITECT



DETAIL OF UPPER STORIES



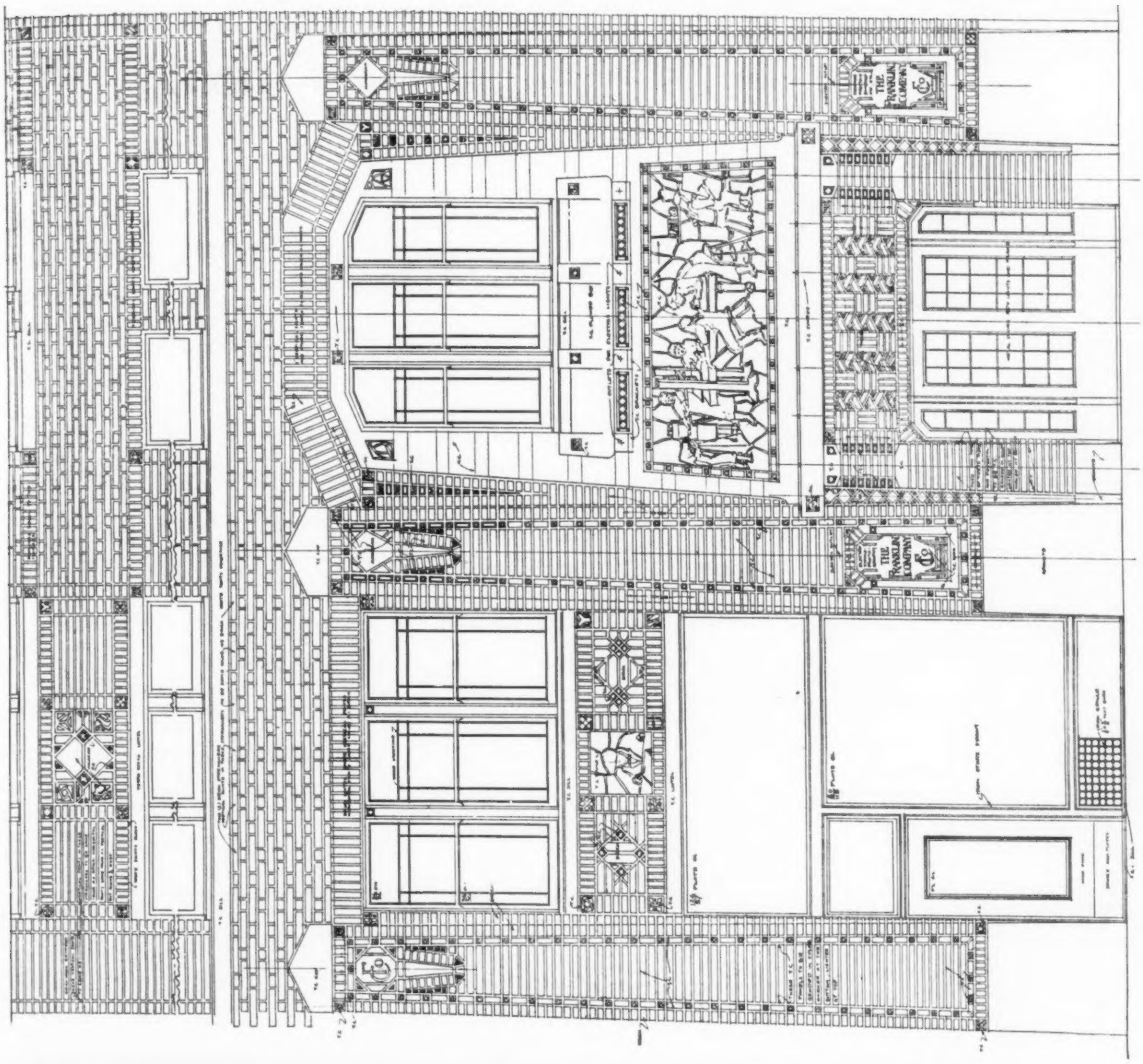
FIRST FLOOR PLAN



TYPICAL FLOOR PLAN

THE FRANKLIN BUILDING, CHICAGO, ILL.

GEORGE C. NIMMONS, ARCHITECT

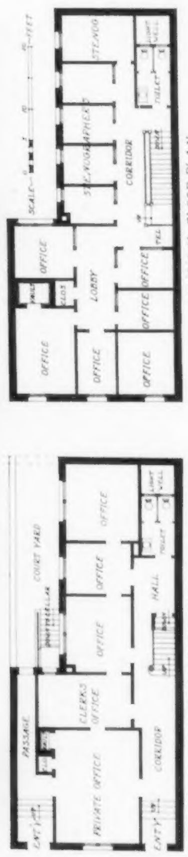


DETAIL OF ENTRANCE AND STORE FRONTS

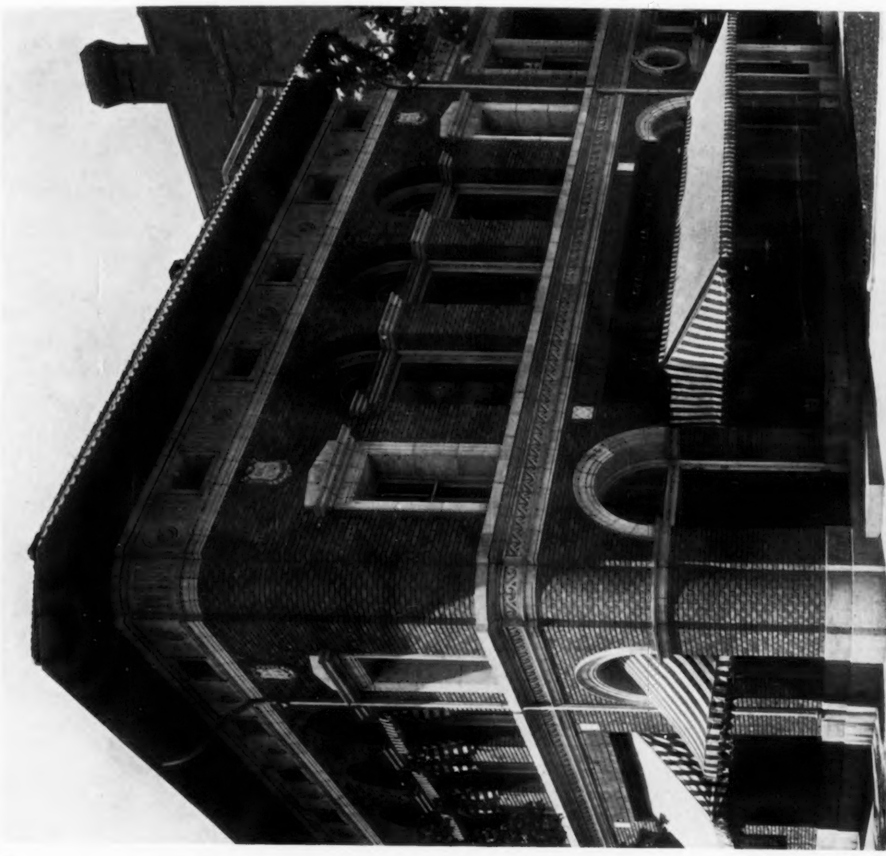
THE FRANKLIN BUILDING, CHICAGO, ILL.

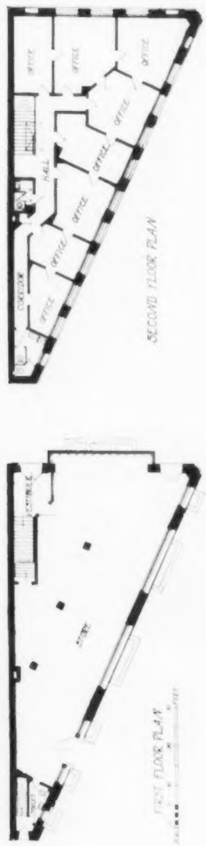
GEORGE C. NIMMONS, ARCHITECT

DETAIL OF ENTRANCE



LAWYERS' OFFICE BUILDING, WASHINGTON, D. C.
ARTHUR B HEATON, ARCHITECT

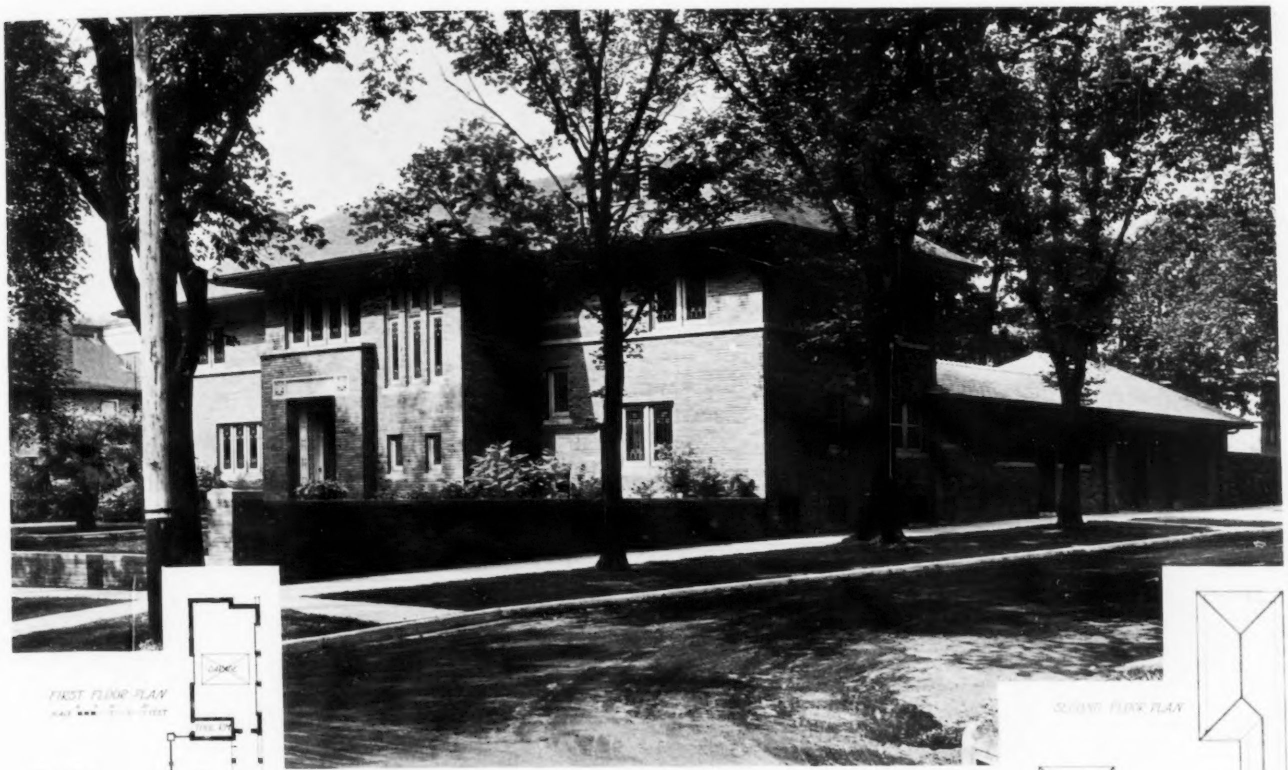


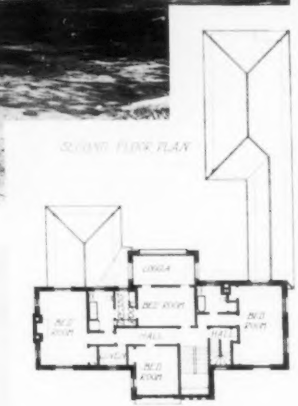


STORE AND OFFICE BUILDING, WASHINGTON, D. C.
APPLETON P CLARK, JR., ARCHITECT

DETAIL OF ENTRANCE

HOUSE AT OAK PARK, ILL.
SPENCER & POWERS, ARCHITECTS





STREET FRONT

GARDEN FRONT

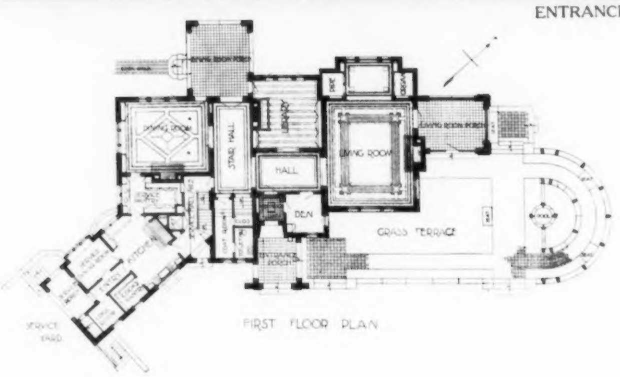
HOUSE AT OAK PARK, ILL.

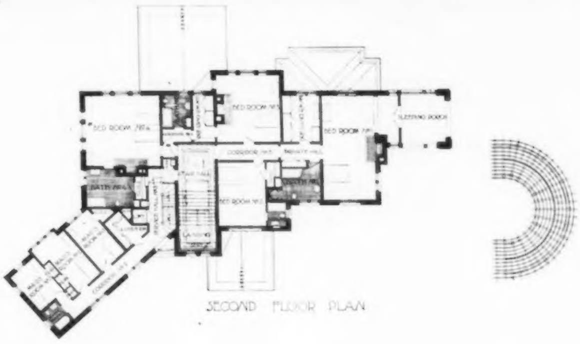
SPENCER & POWERS, ARCHITECTS

HOUSE OF MRS. DENKMANN-HAUBERG, ROCK ISLAND, ILL.

SPENCER & POWERS, ARCHITECTS

ENTRANCE FRONT





VIEW FROM THE EAST

HOUSE OF MRS. DENKMANN-HAUBERG, ROCK ISLAND, ILL.

SPENCER & POWERS, ARCHITECTS

LIVING ROOM

LIBRARY

LIVING ROOM MANTEL

HOUSE OF MRS. DENKMANN-HAUBERG, ROCK ISLAND, ILL.

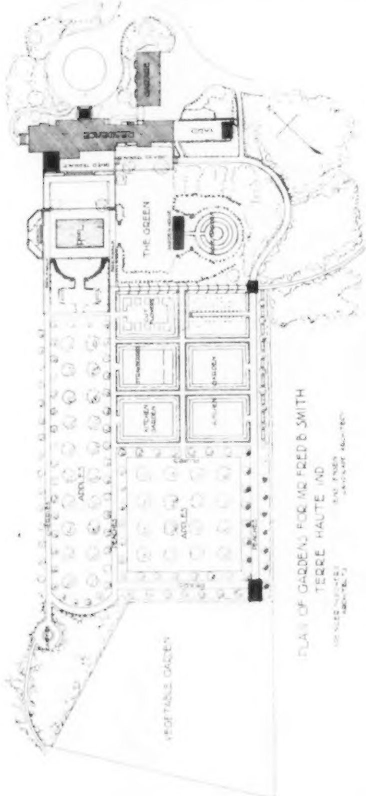
SPENCER & POWERS, ARCHITECTS

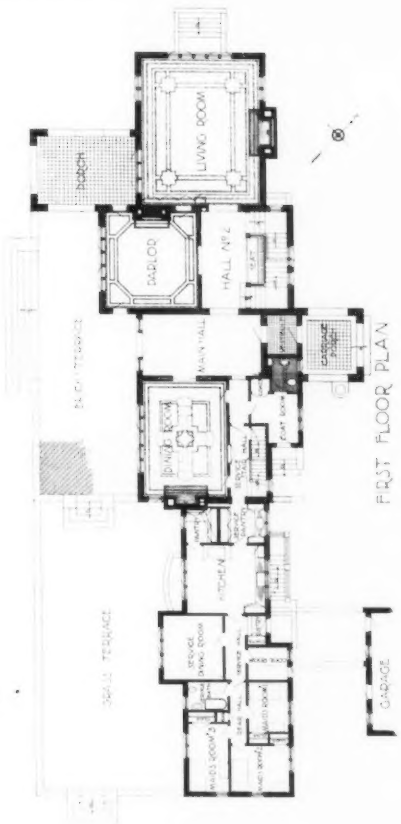
VIEW FROM APPROACH

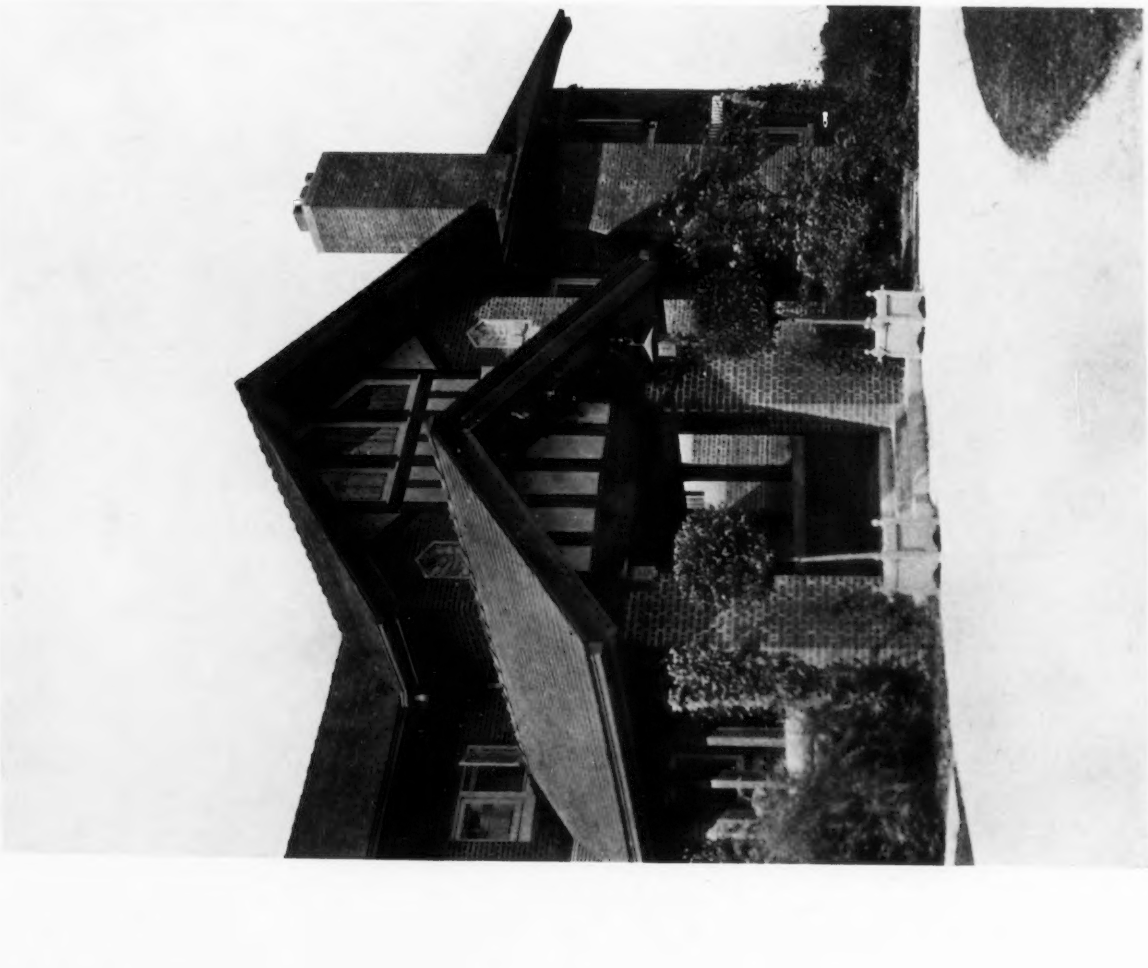
VIEW FROM GARDEN

HOUSE OF FRED B. SMITH, ESQ., TERRE HAUTE, IND.

SPENCER & POWERS, ARCHITECTS

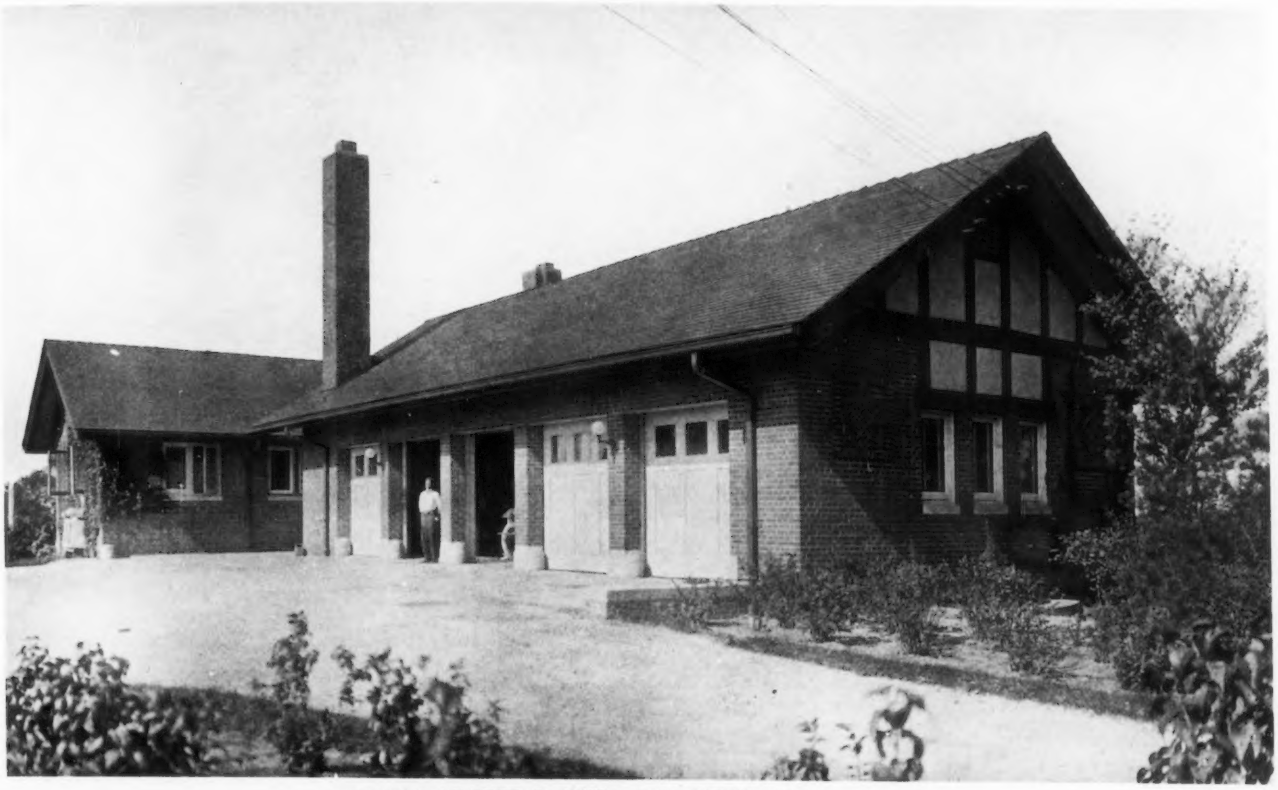






DETAIL OF ENTRANCE FRONT

HOUSE OF FRED B. SMITH, ESQ., TERRE HAUTE, IND.
SPENCER & POWERS, ARCHITECTS



STABLE OF FRED B. SMITH, ESQ., TERRE HAUTE, IND.

STABLE OF MRS. DENKMANN-HAUBERG, ROCK ISLAND, ILL.

SPENCER & POWERS, ARCHITECTS

The Modern Use of Casement Windows.

WITH NOTES ON THE CONSTRUCTION OF METAL AND WOODEN FRAMES ILLUSTRATED WITH AMERICAN AND ENGLISH EXAMPLES.

By HOWARD V. BOWEN.

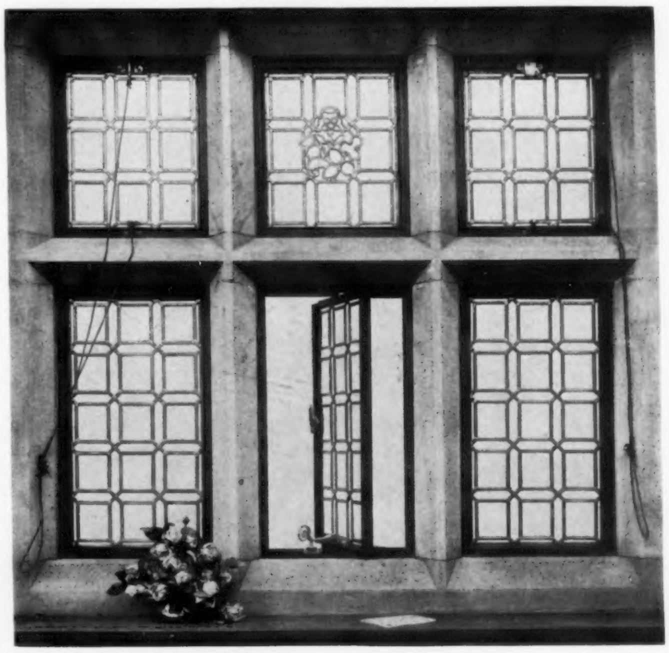
SUCCESSFUL architecture takes careful account of the smallest particular of building and designing. The effect of a completed work depends upon the thoughtful treatment of a great variety of minute details. The architect, accustomed as he is to observing a nicety of balance and possessing a keen appreciation of the value of selecting from a number of possibilities the exact detail which well schooled judgment has taught him to be the one most desirable, regards nothing as undeserving of the most careful consideration.

Hardly any other single detail of planning has more to do with forming the character of a building than its fenestration. The windows of a building are its eyes, upon which depend not only its survey of the world but also its expression. Upon its windows and its doors devolves much of the duty of imparting character and what may be called architectural accent, and the success or failure of a work is often dependent upon the handling — careful or otherwise — of its openings.

But the thoughtful and intelligent planning of such openings is not all which is demanded of the architect. They may be planned with the utmost care, and their positions may be determined after the most thoughtful "visualizing" of the completed structure, and yet be only partially satisfactory to a man who values at their proper worth the *minutiæ* of design. Upon the filling of the windows themselves depends, in a large measure, their architectural value.

Some one has said that building to-day has been hindered as well as helped by the inventiveness of some manufacturers who, by producing what is inexpensive and useful, and therefore likely to be employed, have made of less frequent use other things which are equally useful and far more decorative, but which, for various reasons, seem to win a less ready acceptance into popular favor. Large sheets of glass are, of course, of inestimable value for many uses. One can hardly imagine their not being used for certain windows of shops where the revealing of what may be placed within them is of prime consideration ; but windows for other purposes naturally demand a different treatment.

House at Hewlett Bay, L. I.
Albro & Lindeberg, Architects



Group of Metal Casements with Leaded Glass

Just the extent to which the careful filling of window spaces affects the appearance of a building cannot always be realized until one sees the same structure, or a building exactly similar, treated in different ways. In a certain street in New York City there still exists a row of fine, old houses built, probably, about 1850. The windows of these houses have sashes with very large panes, but recently, in the rearranging of one of the row, casement windows filled with small panes have been installed. The house so altered now possesses a character, individuality, and distinction which is wholly lacking in the other houses.

Many an architect surveys the work of a few centuries ago and wonders if the designers of that day were not blessed either with unusual opportunities or with a special gift for using just what would best interpret or express the meanings which they wished to convey. Neither can be said to be wholly true, but in using the materials which their times made possible they discovered a fortunate method of employing them which may well serve as models for those who practise to-day, especially when the possibilities offered by materials at this time are infinitely greater.

Those who admire the long, horizontal mirrors frequently used over mantels in old-fashioned interiors are apt also to admire the taste and judgment which guided the breaking up of the

Casements in House at Bryn Mawr, Pa.
Duhring, Okie & Ziegler, Architects

surface into three panels — a larger panel at the center divided by a narrow band of gilt frame from a smaller panel at either side. The use of smaller mirrors, however, was no doubt necessitated by the fact that such large surfaced mirrors as would be required were the frame filled with one piece of glass, were either not obtainable or of such great cost as to render their use impossible. Just so with the architects who — say, in the eighteenth century — designed windows; large panes of glass were not always to be had, and in the use of glass which made smaller panes necessary there was found the most successful window treatment. The greater ease with which larger panes are now to be had, and particularly their comparatively small cost, has led to their use to an extent which many architects regret and against which they are not always able to prevail.

Much of the absence of expression of our windows is due not only to the use of large surfaces of glass, but also to the form of the windows themselves. The type popularly known as the "guillotine," or double hung window, has been, until lately, almost wholly in use, and it is difficult to supplant it in popular favor, even though it possess few claims upon popular approval and many defects. The double hung window, besides being hopelessly ugly and usually wholly without character, is balanced or hung upon weights concealed behind the woodwork of the window. These weights occasionally have to be examined, or the cords upon which they hang must be renewed and the woodwork removed to make access to them possible. Besides being difficult to clean, their very nature makes it impossible to open the window more than, at most, halfway.

The casement window, upon the contrary, possesses every advantage which is conspicuously lacking in the former. Consisting, as it ordinarily does, of vertical panels filled with small panes of glass, it confers upon the window opening an expression and vitality which at once improves the appearance of the building. Its use compels careful designing, for instead of there being a single opening filled with one or two large surfaces of glass, the use of casements suggests the division of the space into a group of several smaller windows separated by slender mullions. This form of treatment would be hardly possible were double hung windows used, for each window must have a separate system of weights, and the space which must be allowed for them would necessarily be so

An Unusual Form of Casement Windows in an Old House in Lancashire, England

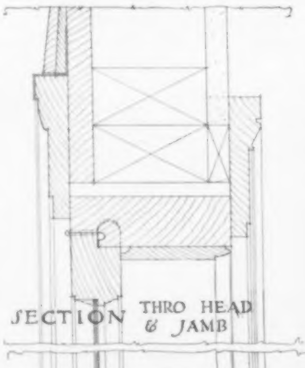


Fig. I. Detail of Wooden Casements Opening Out, Set in a Frame Wall

Detail of House at Cynwyd, Pa., Showing Casement Windows
Mellor & Meigs, Architects

large as to defeat the object of the grouping. A very effective arrangement, where space and particularly where height permits, is to place them one over another. Such grouping, of course, belongs particularly to the buildings of the Tudor or the Jacobean style, but it can be appropriately used in many modern types of houses which lay claim to no definite style.

The value of the casement window, however, is by no means wholly architectural nor based upon advantages which have anything to do with attractiveness of effect. They possess many good qualities which are entirely utilitarian and upon them an architect may often base so strong an argument that the balance, in the mind of a somewhat reluctant client, may be turned in their favor.

House at Wynnewood, Pa., with Leaded Casements
David Knickerbacker Boyd, Architect

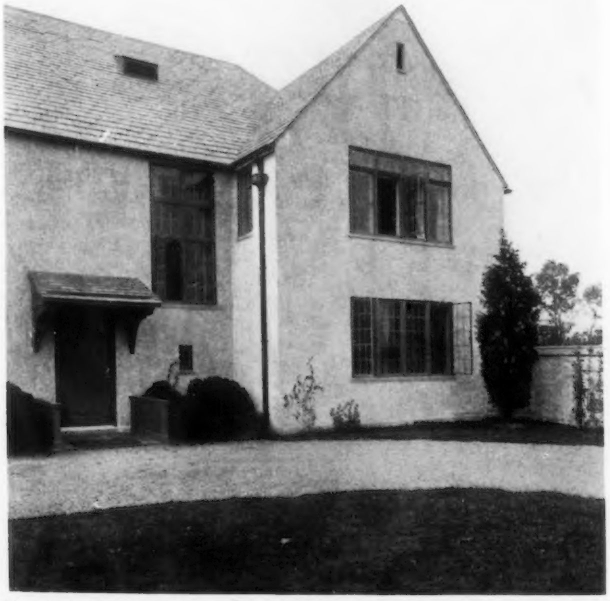
Every housekeeper has struggled with the difficulty of keeping double hung windows reasonably clean. The problem is not always difficult of solution where houses are but one or two stories high, for sitting upon a window sill to wash the outer surfaces of a window presents no particular obstacle to the average housemaid, provided the window be not far from the ground. But this is the day of lofty buildings — tall city dwellings or towering structures containing apartments or business quarters — and the cleaning of their windows can hardly become a part of the duties of even the most courageous woman servant.

Wooden Casement Windows in Country House at Southampton, L. I.
Albro & Lindeberg, Architects

Casement windows offer no such difficulty, for as they are not often more than eighteen inches in width the arm may readily be passed about them and every part of their outer surfaces be easily reached from within. Then, too, casement windows are very often hung with the device which makes possible their being turned about or "inside out," and either the inner or the outer surface presented for cleaning.

An argument in favor of the casement may be based upon the fact that it makes possible the opening of the *entire* window. Almost every part of the country is subject to extremes of heat during a few weeks of the year, at least, and there is nothing more annoying than to be unable to open a window more than halfway, yet this is the most which can be expected of any double hung window.

The use of the casement is the logical remedy for this defect, for it opens to the air every square inch of the window opening — it is "100 per cent window." Indeed, it sometimes does even a little more for,



Detail of House at Bernardsville, N. J., Showing Metal Casement Windows
Delano & Aldrich, Architects

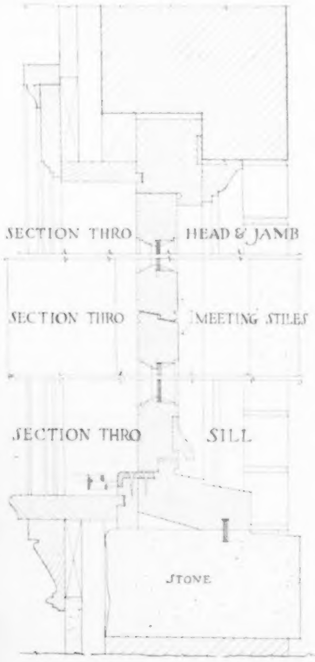


Fig. II. Detail of Wooden Casements Opening In, Set in a Masonry Wall

Detail of Single Metal Casement and Frame Showing Suitable Hardware

projecting as it often does over the sill, it may act as a screen to catch and deflect into a room any stray breeze. Its affording the maximum of ventilation secures for the casement its use in many mercantile buildings where the welfare and comfort of workers during the summer must be considered, and it should certainly recommend itself to architects who are planning rooms with dormer windows where, unless the rooms are to be insufferably warm during the summer, every possible precaution must be taken that adequate ventilation is provided.

In so full and frank a statement of the casement window's advantages and merits it would be hardly fair to omit some reference to the various objections which clients are apt to urge against its use — objections not numerous and, founded as they are upon a misunderstanding of its structure and workings, not difficult to refute. Many a client will say vaguely that he has heard that casements are not weather tight nor burglar proof. Casements when made to swing inward, and particularly when made of wood and set within wooden frames, may not always be weather proof; for wood unfortunately is subject to shrinkage and even when well and thoroughly seasoned is apt to contract, leaving a crevice between the casement and its frame. But precisely the same objection may be brought against every window built of wood, and experience has proved that casements, even though of wood, when arranged to open out, in which case the detail of the sills of both types are identical, are fully as weather tight as double hung windows — the hardest of rains must be driven steadily against them to make possible the entrance of water.

With a reasonable amount of care and time expended in studying the detail of wooden casements, satisfactory service may be had from them when they are not placed in extremely exposed positions. In the detail drawings reproduced herewith are shown examples of construction for casements which have been found to be satisfactory and which can be used with equal success in masonry or frame walls. Figure I shows details of the jambs and sill for frames with sashes opening out, and Fig. II for sashes opening in. In England the ordinary method of forming the rebates in the joint is shown by the dotted lines in Fig. I, but in this country this half round rebate and the astragal mould, shown by dotted lines on the section of the meeting stiles in Fig. II, are usually omitted, the ordinary method for the sides of the meeting stiles following the detail shown here or some variant of this idea.

The position of the frame in Fig. II, would only allow the sash to swing a little more than 90 degrees. If it is desired to have the sashes swing against the walls, the frames must be arranged to set nearly flush with the inside face of the wall if they swing in, or the outer face if they are to swing out. The frames and sashes should be made at least 1¾ inches thick and the sills should be worked from heavy stock to allow for sufficient slope and some form of rebate to prevent the passage of rain and snow. The details of the sills shown here are considered effective in this respect for most sections of the country. Casement sashes are frequently made too large for convenience and become unwieldy and difficult to adjust in heavy winds — 20 inches to 2 feet for width and not over 5 feet for height will be found in most cases to be the largest size that will prove satisfactory.

There are very few casements, however, being made of wood where durable qualities are demanded. Very satisfactory casements and frames are now being made of bronze or steel, and one need only examine a few of these to

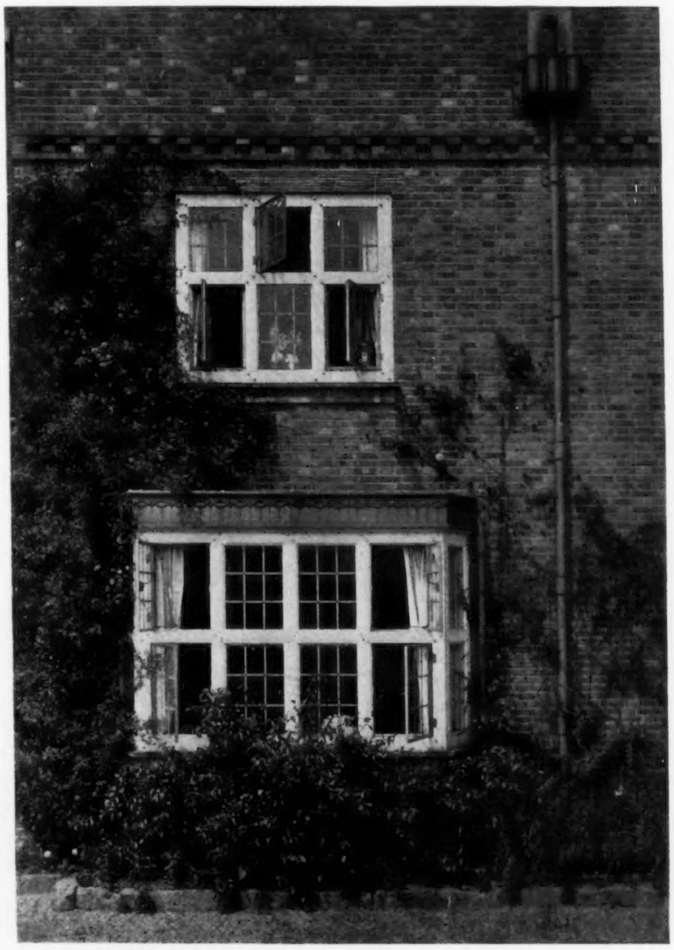
Detail of Metal Casements and Transom Set Within Stone Mullions and Transom Bar

be convinced that they are as absolutely weather proof as human ingenuity can make them. The glass is set within a metal sash which fits with mathematical exactitude in a metal frame arranged for the sash to swing outward. Over the crevice between frame and sash there is placed a strip of metal sometimes an inch wide attached to the sash to protect this joint. There is often attached to the lower rail a condensation gutter designed to catch the water condensing on the inside and carry it out on to the sill by means of weep-holes. All this metal work is so thoroughly welded and fitted together that the entrance of water is an impossibility.

To refute the objection that casements are not burglar proof, examine the accepted mode of fastenings of both types of window. The usual fastening for the double hung window consists of a catch which secures the top of the lower sash to the bottom of that above. In windows of this type where the meeting rails are not counterchecked, and in practically any wooden sash after it has been exposed to the weather, a crevice due to shrinkage occurs between the rails, and into this space a thin blade may be inserted which will unfasten the catch.

By way of contrast examine the fastenings of a casement window. The frames being of metal cannot contract, and the fastening, which even in the case of the wooden sash is after the style of a bolt, prevents the window being forced open from the outside. The outer strip of metal, welded to the swinging casement and which renders it proof against the weather, makes it equally secure against burglars.

Detail of Casement Windows in House Shown Below



Metal Casements in House at Birmingham, England

The advantages of casements from the decorative point of view are many. Their possibilities, in so far as they deal with the exterior of a building, have already been touched upon; but an architect must design the interior fittings as well as the exterior details, and the effect of casements upon the interior should not be overlooked.

They suggest the use of leaded glass to an extent which is interesting alike to architects and decorators. Casements and leaded glass seem closely related from the almost universal use of leading in the windows of old European buildings. Examine any old village cottage or vine-clad Tudor residence in England, or the venerable half timbered façades in Rouen or Rheims, and it will be seen that the casements are filled with leaded glass in patterns often highly ornate but sometimes fully as beautiful by reason of their quaint simplicity. Leaded glass, even when not old, has a tendency to fall somewhat out of perpendicularity; the softness or pliability of the leads makes possible the holding of some fragments of glass at angles which, varying as they do from exact position, afford a play of light and shade which lends added quaintness and picturesqueness to the window.

The resourcefulness of the manufacturers of casements has provided a considerable variety of appropriate hardware for their use. The locks or fastenings used for casements, and the stays or braces by which they are held in position, when open, heighten immeasurably the quaintness of any interior in which they are used.

Heating and Ventilating.

II. SPACE REQUIRED FOR APPARATUS.

By CHARLES L. HUBBARD.

THE data and observations set forth in this article are intended to assist the architect in the planning of airways in buildings of large size and also in approximating the space required for boiler and fan rooms under different conditions.

This subject has been suggested by the experience of the writer in receiving from architects numerous plans for laying out heating and ventilating systems, where the space reserved for this purpose was either much too small or else so arranged as to be difficult of utilizing to the best advantage.

It is evident there can be no hard and fast rule for laying out the ducts and flues, as the governing conditions vary so widely in different buildings. However, there are certain general principles which may be made to apply in a majority of cases by varying them somewhat, and which will serve as a guide to the architect in planning the general scheme of his building.

The first step in any case is to determine the volume of air to be supplied to each room; next the size of the flue; and finally its location, which, to a certain extent, depends upon its necessary size.

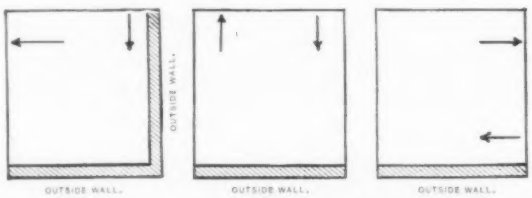


Fig. I Fig. II Fig. III

Arrangements of Inlet and Outlet

Air Volume. The volume of air depends upon the use of the room and the number of occupants, modified to a certain extent by local conditions, such as cost limit of ventilating system, arrangement of rooms, length of time they are used continuously, etc. Tables I and II, from "Power, Heating, and Ventilation," will be found of assistance in assuming the volume of air to be supplied.

TABLE I.

AIR SUPPLY FOR VARIOUS BUILDINGS.

Air supply per occupant for	Cubic feet per minute.	Cubic feet per hour.
Hospitals	80 to 100	4,800 to 6,000
High schools	50	3,000
Grammar schools	40	2,400
Theaters and assembly halls	25	1,500
Churches	20	1,200

TABLE II.

AIR SUPPLY FOR VARIOUS ROOMS.

Use of room.	Changes of air per hour.
Public waiting rooms	4 to 5
Public toilets	5 ,, 6
Coat and locker rooms	4 ,, 5
Museums	3 ,, 4
Offices, public	4 ,, 5
Offices, private	3 ,, 4
Public dining rooms	4 ,, 5
Living rooms	3 ,, 4
Libraries, public	4 ,, 5
Libraries, private	3 ,, 4

Size of Flues and Ducts. Having determined the volume of air to be supplied to the different rooms, the sectional area of the flue, in square feet, is found by dividing the cubic feet of air per minute by the velocity to be maintained. For gravity circulation, in the case of buildings like churches, hospitals, schools, etc., it is customary to assume average velocities in the supply flues about as follows:

	Ft. per min.
1st floor	250
2d floor	300
3d floor	350

The velocity in the vent flues will be somewhat less on account of the lower air temperature, and may be taken as below:

	Ft. per min.
1st floor	220
2d floor	260
3d floor	300

In work of this kind the heater should be placed directly at the base of the flue and the cold air connection made as short and direct as possible, and the full size of the warm air flue. When two or more heaters are supplied from a trunk line, the main duct should have a sectional area equal to all of the warm air ducts connecting with it. If the trunk line has two inlets, on different sides of the building, each should equal the full size of the duct.

When a fan is used, considerably higher velocities may be employed as follows:

	Ft. per min
Inlet windows to heater	1,000
Main duct from fan	1,200
Branches to flues	900
Vertical flues to rooms	600
Through registers	350
Vent flues	350

In the case of court-houses, municipal buildings, etc., where there are a large number of rooms and several floors, it is necessary to reduce the flue space to a minimum.

For buildings of this character and of fireproof construction it is customary to use terra cotta flue linings, on account of their smooth interior, and employ a velocity of about 1,000 feet per minute by speeding up the fan. The same velocities may be obtained in the vent flues by connecting them with a centrifugal exhauster placed in the attic. When these high velocities are employed, great care must be taken to make all ducts and flues tight against leakage, to have the interior smooth and without abrupt bends, so far as possible.

Arrangement and Location of Airways. The arrangement of the flues will depend largely upon the type of building. In the gravity heating of halls and churches of small and medium size the air may be brought in at points

near each corner, preferably through wall registers 7 or 8 feet above the floor. If the rooms are not too large, the discharge ventilation may be through grilles or registers in the front of the platform and connecting with a flue carried up on the rear wall. It is well to supplement this with one or more ceiling vents for use in mild weather. If the auditorium is of considerable length, it is best to add a second vent flue at the other end. In the case of school buildings, where the rooms are large and the arrangement similar, or the same on each floor, more definite rules may be given. One inlet and one outlet is usually sufficient for a standard class room, and either of the general arrangements shown in Figs. I, II, and III may be used according to choice as to which is the more convenient. The inlet registers should be from 7 to 8 feet above the floor and the vents either at the floor or just above the baseboard. A typical arrangement for a bank of flues on the scheme of Fig. III is shown in plan and elevation in Fig. IV. In this case the supply flues are carried up near the outer wall and the vents at the inner end of the partition, with the space between utilized for closets or bookcases. This is probably one of the best arrangements for general schoolhouse work, being fairly compact and bringing the supply and vent openings in positions for the most effective results. On account of the offsets in the supply flues it is rather better adapted to sheet metal than to masonry construction, although either material may be employed.

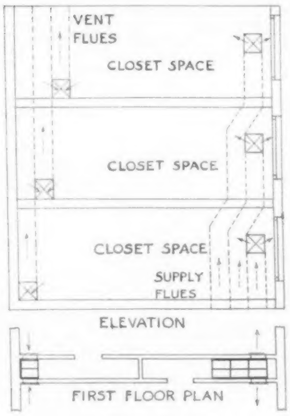
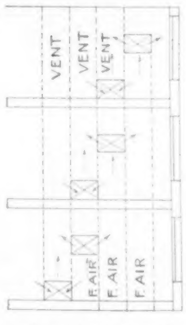


Fig. IV



A compact arrangement of flues without offsets which will give a satisfactory distribution of air.

Fig. V

A very compact arrangement of flues, in which there are no offsets, is shown in Fig. V. The only objection to this is the location of the vent flues, which are too near the outer wall for ideal conditions. However, the supply flues are well placed, which is of greater importance, and a very satisfactory air distribution may be obtained with this arrangement.

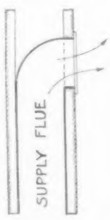


Fig. VI

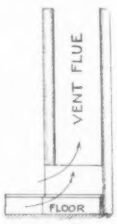


Fig. VII

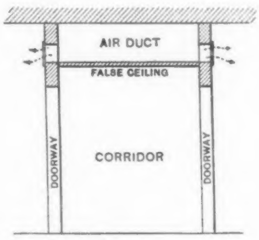


Fig. VIII

In order to avoid offsets, or double partition walls, the supply flues are made the same size as the vents. This scheme is especially adapted to masonry construction and where the space is limited. Each building, of course, requires special treatment; but the diagrams given represent standard practice and may be modified to fit a variety of conditions. The flue arrangement in Fig. II is practically the same as shown in Fig. IV, the only difference being that the flues are located in a rear or corridor wall and therefore only a single bank may be used.

The top of the supply flue should be curved and the register opening made the full width of the flue in order to obstruct the air flow as little as possible. One of the most sanitary arrangements for the vent outlet is to omit the usual grille or register face and extend the floor and baseboard so as to include the flue. Typical diagrams for inlet and outlet openings are shown in Figs. VI and VII. The fan and heater room should be centrally located in order to make the supply ducts symmetrical, thus equalizing the resistance to air flow and assisting in the distribution to the various rooms.

The connecting ducts between the fan and the vertical flues form an important part of a ventilating system. All bends should be well rounded and adjustable deflectors provided at the junctions. These airways are usually constructed of galvanized iron and carried at the basement ceiling, although underground ducts of concrete are often used where the basement rooms are utilized for class-room purposes and it is desired to keep the ceilings free from all obstructions. Underground ducts are more expensive to construct and produce a considerable loss of heat unless lined with some sort of insulating material, which adds still further to their cost. Care should also be taken in work of this kind to make the ducts waterproof when the soil is such as to call for this precaution. Sometimes the building arrangement is such that the upper part of the basement corridor may be made to serve as the main distributing airway by constructing a false ceiling 2 or 3 feet below the main ceiling. This serves as a supply reservoir under pressure from which branch ducts may be carried to such flues as are off the direct line of the main airway. In cases of this kind care should be taken to provide either adjustable dampers or deflectors as may be best adapted to give to each flue its proper proportion of air.

In large churches and theaters the air is best distributed by delivering it into a closed space beneath the floor and discharging it into the room through specially constructed slots or grilles in the pews, or through "mushroom" outlets beneath the chairs. In small churches and halls the treatment is more nearly like that employed in school buildings.

In the case of hospitals the method will depend a good deal upon the type of building. Indirect heat is largely used in cottage hospitals one or two stories in height, bringing the warm air in through wall registers beneath the windows. The basements of buildings of this kind usually provide ample space for any arrangement of cold air supply desired, and often the entire basement, or a considerable portion of it, is used as an air chamber. In larger institutions a fan system should always be employed, and owing to the large number of small rooms comparatively high velocities are made use of to reduce the flue space required. In buildings of this kind the rooms are commonly arranged along main corridor-ways and the flues carried

up in banks along the corridor walls. The general arrangement may be similar to those shown in Figs. IV and V, with a supply fan in the basement and an exhaust fan in the basement or on the roof as is most convenient.

In the ventilation of tall office buildings, where it would be practically impossible to reach all of the rooms with separate flues from the basement, the best plan is to carry up one or more large flues of sufficient capacity to supply the entire building and at each floor connect with distributing ducts formed by furring down the corridors, as shown in Fig. VIII. Deflectors are placed in the main flue at each floor for regulating the air flow, and the inlets to the rooms lead directly from the horizontal ducts as indicated in the diagram.

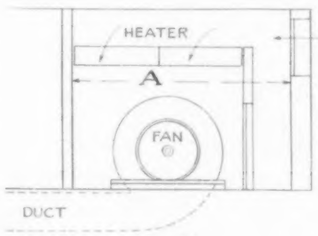


Fig. IX

The fresh air supply for a fan system in city buildings should be taken from a point well above the street level in order to avoid surface dust as much as possible. There seems, however, no particular advantage in placing the inlet more than 20 or 30 feet above the street grade, for above that level the principal impurity is soot, which is found at all elevations to the top of the building. In the case of schools, churches, etc., which are surrounded by a considerable extent of lawn, the air supply may usually be taken in at the ground level without picking up an excessive amount of dust. The supply duct should enter the building as near the fan as possible in order to keep the frictional resistance at a minimum. In planning for indirect heating the supply flues and heating stacks should first be located and the cold air inlets provided for with reference to them.

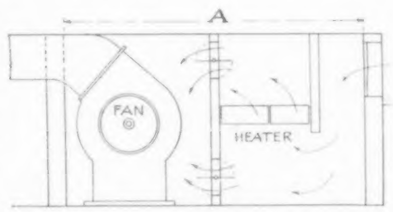


Fig. X

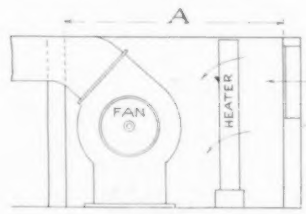


Fig. XI

Space Required for Ventilating Apparatus. The space required for the fan and main heater will vary of course with the particular arrangement used. Three different schemes are shown in Figs. IX, X, and XI. In the first of these the heater is made up of cast-iron sections supported on iron beams above the fan as indicated. A fan with a three-quarter housing is used in this case, discharging into an underground duct, although an angular up-discharge may be employed if it is desired to use overhead distributing ducts.

In making up Table III the required space is based on heating the air from zero to 110 degrees, using standard pin radiator sections rated at 20 square feet per section. For lower temperatures, such as are employed in purely ventilating work where direct radiation is used for warming, shallower sections would be used, but the horizontal dimensions would be practically the same. Hence, Table III applies approximately to all ordinary conditions for this particular arrangement of fan and heater. The size of the fan is based on capacities and speeds given in the previous article in the February issue. The dimensions are for fan and heater rooms combined, and allow for the space required for interior division walls, supports, etc. It is also assumed that direct connected motors or engines will be used for driving the fan.

TABLE III. (See Fig. IX.)

Cubic feet of air per minute.	Height of room.	Length of room ("A").	Width of room.
5,000	9′	13′	8′
10,000	10′	14′	8′
15,000	12′	16′	9′
20,000	13′	20′	9′
25,000	14′	20′	10′
30,000	15′	20′	11′
40,000	16′	22′	12′
50,000	18′	26′	13′

Another layout is shown in Fig. X, using the same type of heater based upon the same capacity. In this case the heater is suspended midway between the floor and ceiling and the path of the air is indicated by the arrows.

Table IV gives dimensions for this arrangement. For capacities up to 20,000 cubic feet per minute, full housed fans have been assumed, as shown in the accompanying diagram, while for larger air volumes the three-quarter housing for the fan has been taken, as shown in Fig. IX, in making up Table IV in order to reduce the required height of room.

TABLE IV. (See Fig. X.)

Cubic feet of air per minute.	Height of room.	Length of room ("A").	Width of room.
5,000	9′ 0″	14′	8′
10,000	9′ 6″	18′	8′
15,000	10′ 0″	20′	11′
20,000	10′ 6″	22′	15′
25,000	11′ 6″	26′	15′
30,000	11′ 6″	28′	16′
40,000	12′ 0″	30′	19′
50,000	12′ 6″	32′	23′

Table V refers to Fig. XI, in which a pipe heater of standard form is used. Two different lengths of room ("A") are given, one for the apparatus as shown in the diagram, and the other when an air washer is employed.

TABLE V. (See Fig. XI.)

Cubic feet of air per minute.	Height of room.	Width of room.	Length without air washer ("A").	Length with air washer ("A").
5,000	9′	8′	12′	20′
10,000	9′	9′	13′	21′
15,000	11′	11′	15′	23′
20,000	11′	16′	17′	25′
25,000	11′	19′	18′	26′
30,000	12′	20′	20′	28′
40,000	12′	20′	22′	30′
50,000	12′	20′	25′	33′

In special cases where room is limited, the space given in the tables can be reduced somewhat by laying out the apparatus to scale and by making arrangements especially adapted to the case in hand. The dimensions given are for average conditions and are intended to give ample room not only for the apparatus but also working space for the attendants.

Space Required for Boiler Rooms. The first step in determining the size of boiler room is to approximate the horse-power which for heating may be done by means of the charts given in the preceding article. The boiler horse-power for ventilation may be found by multiplying the cubic feet of air to be supplied per *minute* by 0.0026. When the building is to contain a power plant, or combined power and heating plant, the total horse-power to be provided should be obtained from the engineer, as the problem of determining it becomes somewhat complicated and depends upon varying conditions.

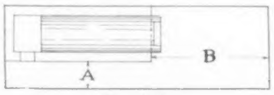


Fig. XII

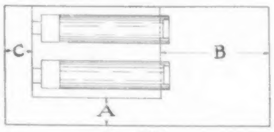


Fig. XIII

In all plants of any considerable size, at least one spare boiler should be furnished for an emergency.

In laying out a boiler room there must not only be sufficient space for the boiler itself, but also for cleaning, firing, and drawing the tubes. Fig. XII shows a horizontal return tubular boiler placed in a corner of the boiler room. When this is done, the outer wall of the setting may be omitted by providing an air space, at least 4 inches in depth, between the setting and building wall on the side and rear.

The space "A" for reaching the cleanout door should not be less than 3 feet. The space "B," in front of the boiler, should be about 6 inches greater than the length of the tubes. This amount of space is not required for firing purposes but for drawing the tubes.

Two boilers set in a battery are shown in Fig. XIII. In this case a space is allowed at the rear for reaching the cleanout doors. When possible the distance "C" should be made about 3 feet, although 2 feet may be made to answer when the available room is limited.

Reference has been made above to the space required for drawing the tubes of a boiler. There are different ways of reducing this, two of which are shown in Figs. XIV and XV. In the first of these a window is provided in front of each boiler, either in an outside or inside wall, furnished with a removable sash. The second case is sometimes used where the boilers are well below the street grade and face an outside wall. Here a special excavation is made to a point slightly above the tops of the tubes as indicated, without carrying it up to the top of the boiler room.

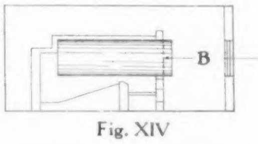


Fig. XIV

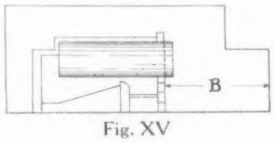


Fig. XV

TABLE VI.

Diameter of shell.	Length of tubes.	Horse-power.	Diameter of shell.	Length of tubes.	Horse-power.
30″	7′	10	54″	13′	41
30″	8′	11	54″	14′	44
30″	9′	13	54″	15′	47
36″	9′	15	60″	14′	56
36″	10′	17	60″	15′	60
36″	11′	19	60″	16′	64
42″	10′	21	66″	14′	70
42″	12′	26	66″	15′	75
42″	14′	29	66″	16′	80
48″	11′	33	72″	15′	94
48″	12′	35	72″	16′	100
48″	13′	38	72″	17′	106

After determining the total horse-power required, the number of units should be decided upon, after which the diameter and length of shell may be taken from Table VI.

The horse-powers given in the table are based on the tube arrangement recommended by the Hartford Steam Boiler Inspection and Insurance Co. The lengths given are those of the tubes.

Table VII, taken from "Power, Heating, and Ventilation," gives the over all dimensions of horizontal tubular boilers with both light and heavy settings, and may be used in determining the required floor space.

TABLE VII.

HEAVY SETTING FOR POWER.

Diam. of shell.	30″	36″	42″	48″	54″	60″	66″	72″
Length of setting = Length of tubes +	3-6	3-8	3-8	4-2	4-2	4-2	4-2	4-2
Width of setting. 1 boiler	5-8	6-10	7-4	7-10	9-0	9-6	10-0	10-6
Width of setting. 2 boilers	9-8	11-8	12-8	13-8	15-8	16-8	17-8	18-8
Width of setting. 3 boilers	13-8	16-6	18-0	19-6	22-4	23-10	25-4	26-10
Width of setting. 4 boilers	17-8	22-4	23-4	25-4	29-0	31-0	33-0	35-0

LIGHT SETTING FOR HEATING.

Diam. of shell.	30″	36″	42″	48″	54″	60″	66″	72″
Length of setting = Length of tubes +	3-2	3-4	3-4	3-10	3-10	3-10	3-10	3-10
Width of setting. 1 boiler	5-8	6-2	6-8	7-2	7-8	8-2	9-10 9-4	11-4 9-10
Width of setting. 2 boilers	9-8	10-10	11-10	12-10	14-0	15-0	17-8 16-8	18-8 17-8
Width of setting. 3 boilers	13-8	15-6	17-0	18-6	20-4	21-10	25-6 24-0	26-6 25-0
Width of setting. 4 boilers	17-8	20-2	22-2	24-2	26-8	28-8	33-4 31-4	34-10 32-10

NOTE. — Upper figures at bottom of last two columns to be used when width of grate equals diameter of boiler.

The minimum height of room is given below, which allows 3 feet above the boiler for pipe connections. When possible, an extra foot or two should be provided, especially in case of the larger sizes, when there is considerable piping over the boilers and numerous valves to be reached.

TABLE VIII.

Diameter of boiler.	Height of room.	Diameter of boiler.	Height of room.
30″	9′ 6″	54″	11′ 6″
36″	10′ 0″	60″	12′ 6″
42″	10′ 6″	66″	13′ 6″
48″	11′ 0″	72″	14′ 6″

The various makes of water-tube boilers vary so much in form and size for a given capacity that the actual dimensions of the type and power of boiler to be used should be obtained before reserving the space. In general, a water-tube boiler requires less floor space than a return tubular, but usually needs more head room, except in case of certain forms made especially for low basements.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

MODERN architecture has been discussed much of late to its detriment. We have heard how architecture of the present day is the result of borrowing; but we have failed to note any instance which has been given or any suggestion which has been made as to how borrowing may be avoided or by what other means architecture can be bettered. There are those who contend that an architectural system based upon borrowing either as a constructive or as a decorative principle is as prejudicial to healthy artistic growth as a persistent habit of borrowing from one's neighbors in terms of dollars and cents is contrary to sound domestic finance and harmful to social amenities. Others claim that we are all borrowers and shall continue to borrow in architecture until the end.

It is admitted that it is undertaking what seems impossible to create a new style in the present day. Traveling has become common and with the increased knowledge of things architectural, propounded by the literature of the day, sharp distinctions between the styles are bound to drop. The enormous number of books have helped to transplant into alien territories the different styles we see to-day. Some one has said that the evil genius of the art of architecture has always been the literary man. To go back a long way, the Romans were happily and successfully building beautiful, ample, round, arched structures when the literary person of the age declared that true chasteness was to be found only by using the straight lines of Greece. The man in the street combined with the literary man (these two have much in common) forced the architect out of the way of his inclination into the paths of dulness. Again, at the Renaissance the men of letters, also in conjunction with the public, forced the designer to forsake his preference. Now when we have become accustomed to our borrowed finery we are driven with suddenness into all sorts of styles until, with the latest extremists, we are threatened to be denuded of all our accumulated rags as being wholly unnecessary for clothing the nakedness of our structural forms.

Does not constructive criticism of the situation suggest that the pressing hindrance to good architecture to-day is not alone attributable to the use of borrowed forms, but to the love of wealth for wealth's sake? Can it not be said that the worship of wealth for wealth's sake alone has gone far in upsetting the production of good work? Rome set out to conquer the world, and her object was to increase her wealth. In the process she appropriated the architecture of Greece and debased it. With the arrival of the Renaissance there was a great output of wealth, a great increase in trades, a great striving for money for its own sake. Of what use was the architecture of Greece to the people of this age? That was an intellectual effort, but the making of money was not. They could not understand the subconscious influence of the Greek, his high ideals and noble aspirations. They turned to the martial and wealthy people — the Romans — for their inspiration.

Is the outburst of enthusiasm for classical forms evidenced to-day due to the fact that we are still worshiping wealth for wealth's sake? Do we erect almost endless colonnades before our public buildings as did the Romans to satisfy our love for wealth and the ostentation which it encourages? Are we really sincere in our efforts to indicate in terms of structural and decorative materials the function of a building which it is claimed is the primary object of architecture, or do we solve our problems in design by formula based on the varying imposing effects which architectural contrivances will produce?

Intelligent study of economic and social conditions to-day should be the foundation of architectural style, and it must have an important bearing upon the development of any new architectural forms. If conditions to-day are the same as those that brought into being the imposing and masterful architecture of Rome, let us make use of their forms; for if architecture is really an expression of the life of the people, those same forms would be produced to-day. If there is to be developed an American style differing from any that has been produced in the preceding ages, it will be the result of differing conditions. If we are to abandon the old established forms for better ones, we have first to change the economic conditions of our time, to improve the people's thoughts and ideals, which give rise to architectural styles — then we may expect the stimulating impetus and need for newer and better architectural forms.

THE jury of award of the George Washington Memorial Association has accepted the design of Messrs. Tracy & Swartwout for the proposed new auditorium. The building is to be not only a fitting memorial to the first president and his interest in higher education in America, but also a national headquarters for patriotic, scientific, educational, literary, and similar organizations.

It is interesting to note that with the exception of the Mormon Temple in Salt Lake City, this Washington memorial will be the first large building in which the audience — in this case six thousand — will be seated in accordance with the modern theory of acoustics. To make sure that there would be no "deaf spots" or places where the speaker's voice could not be heard by a large part of the audience, the elliptical plan for the auditorium was adopted. The theory is that there is a line of equal sound extending from the speaker's platform around the room, and that this line is an ellipse. A man sitting in the last row and directly facing the speaker hears just as well as one who sits nearer but off to one side. The ellipse by permitting more people to sit facing the speaker within a given area is therefore regarded as the most economical arrangement. The auditorium will have a flat domed roof constructed of tile especially adapted to absorb sound and will be 270 feet in length by 200 feet in width.